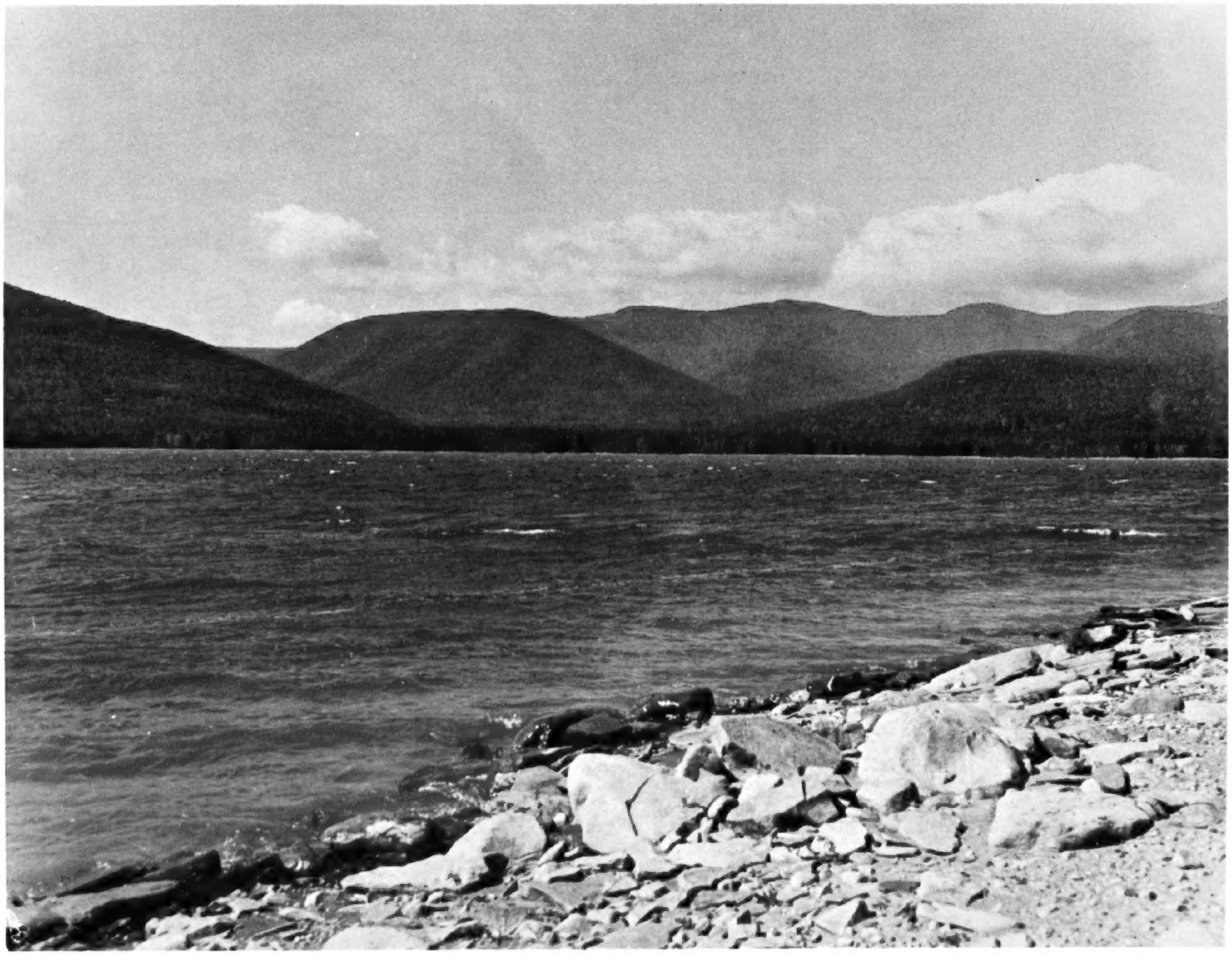
SOIL SURVEY OF

Ulster County, New York



United States Department of Agriculture
Soil Conservation Service
in cooperation with
Cornell University Agricultural Experiment Station

HOW TO USE

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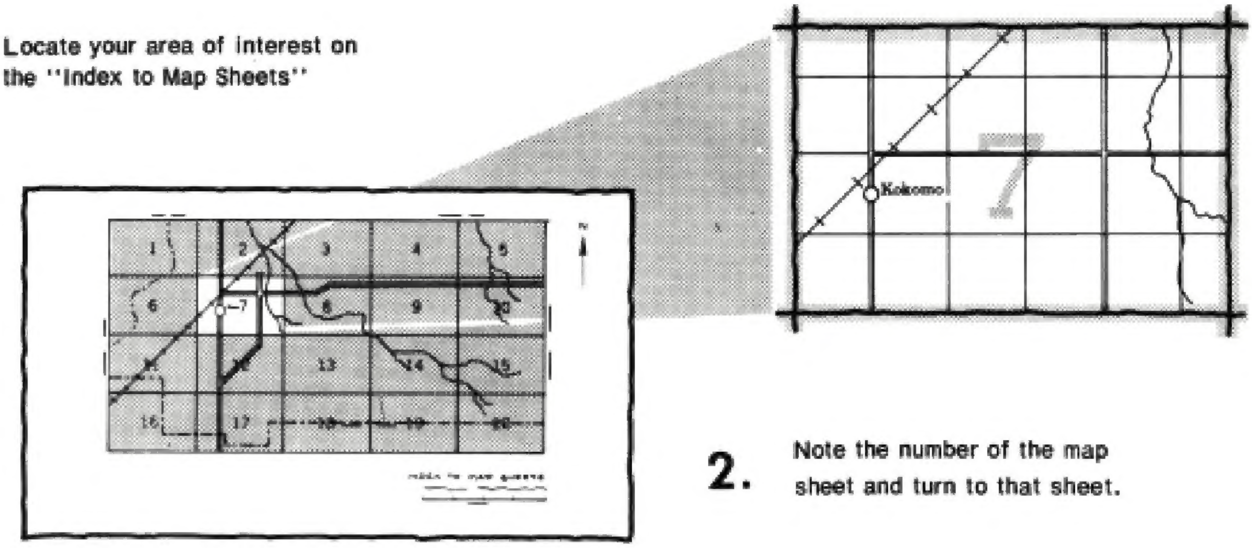

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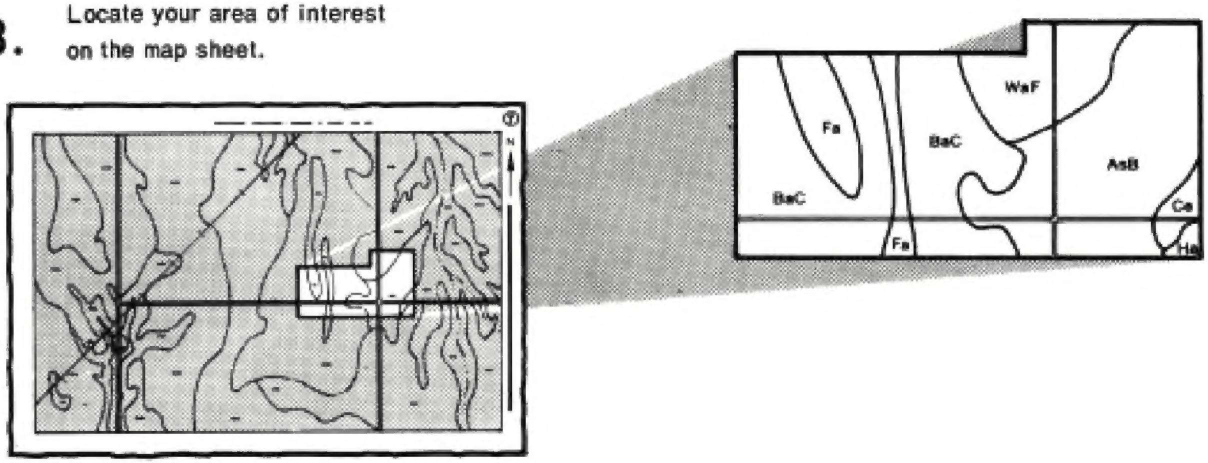

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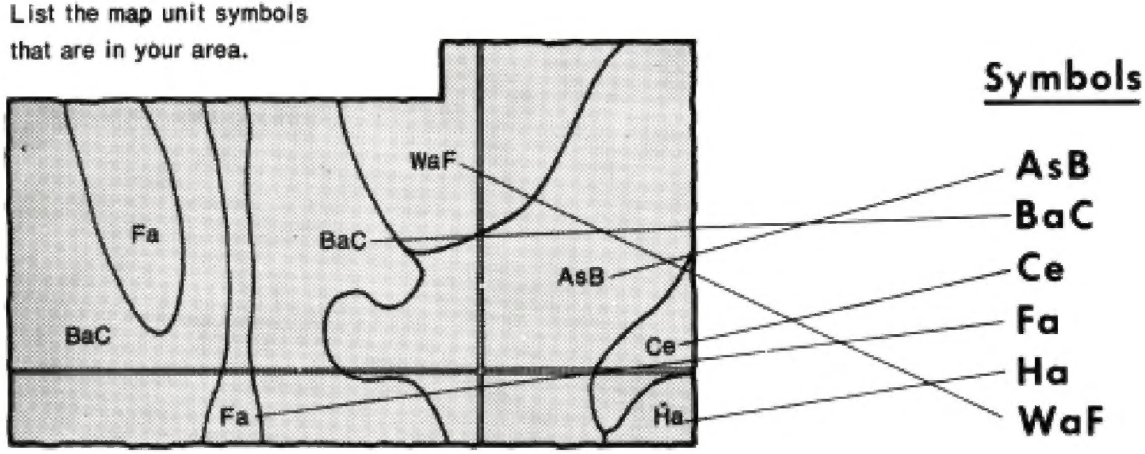
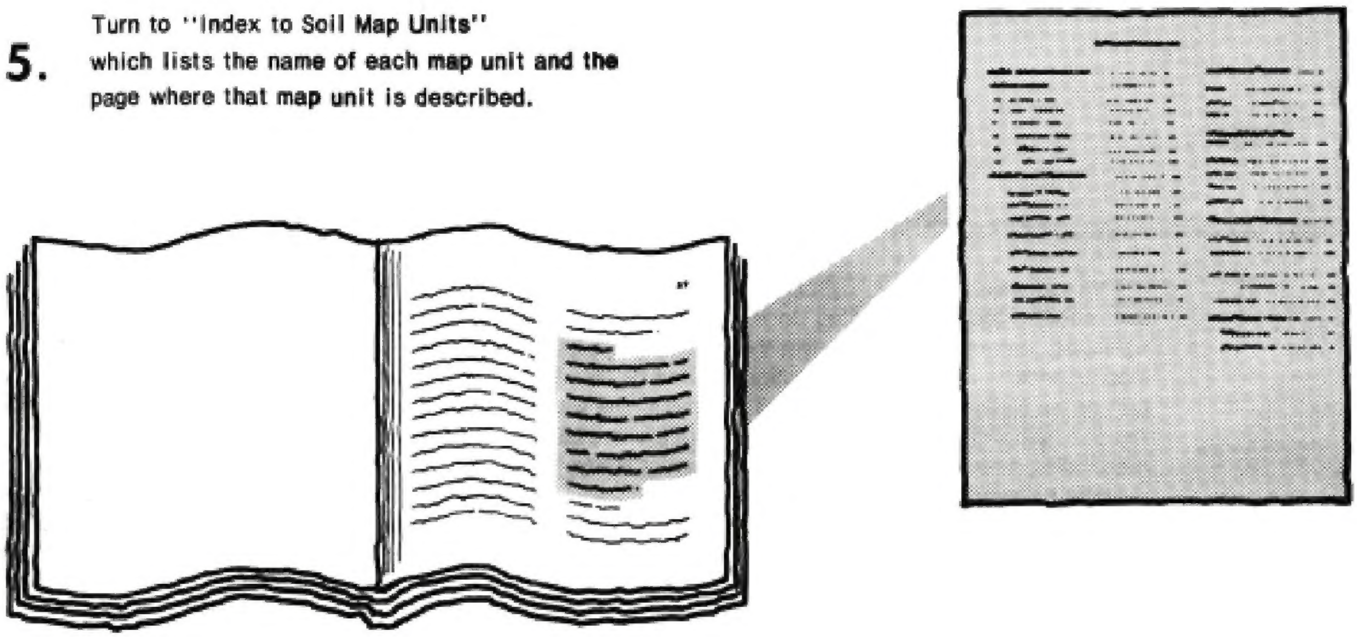
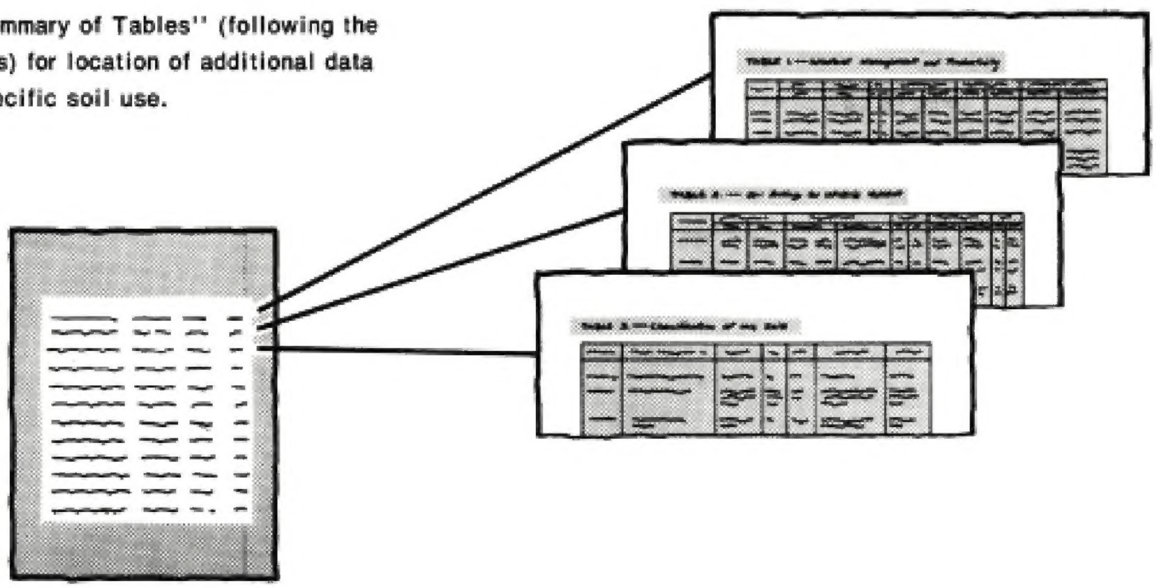


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1968-73. Soil names and descriptions were approved in 1974. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1974. This survey was made cooperatively by the Soil Conservation Service and the Cornell University Agricultural Experiment Station. It is part of the technical assistance furnished to the Ulster County Soil and Water Conservation District. Part of the funding for this survey was provided by the Ulster County Legislature and the Palisades Interstate Park Commission through the Ulster County Soil and Water Conservation District and the Ulster County Planning Board. Also providing financial aid were the U.S. Department of Housing and Urban Development and the New York State Office of Planning Services.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: The Ashokan Reservoir is in the foreground, and the Catskill Mountains are in the background. Arnot, Oquaga, and Lackawanna soils are extensive in the mountains. Stones in the foreground help to control wave action erosion.

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Foreword

The Soil Survey of Ulster County, New York contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

Robert L. Hilliard

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State Conservationist
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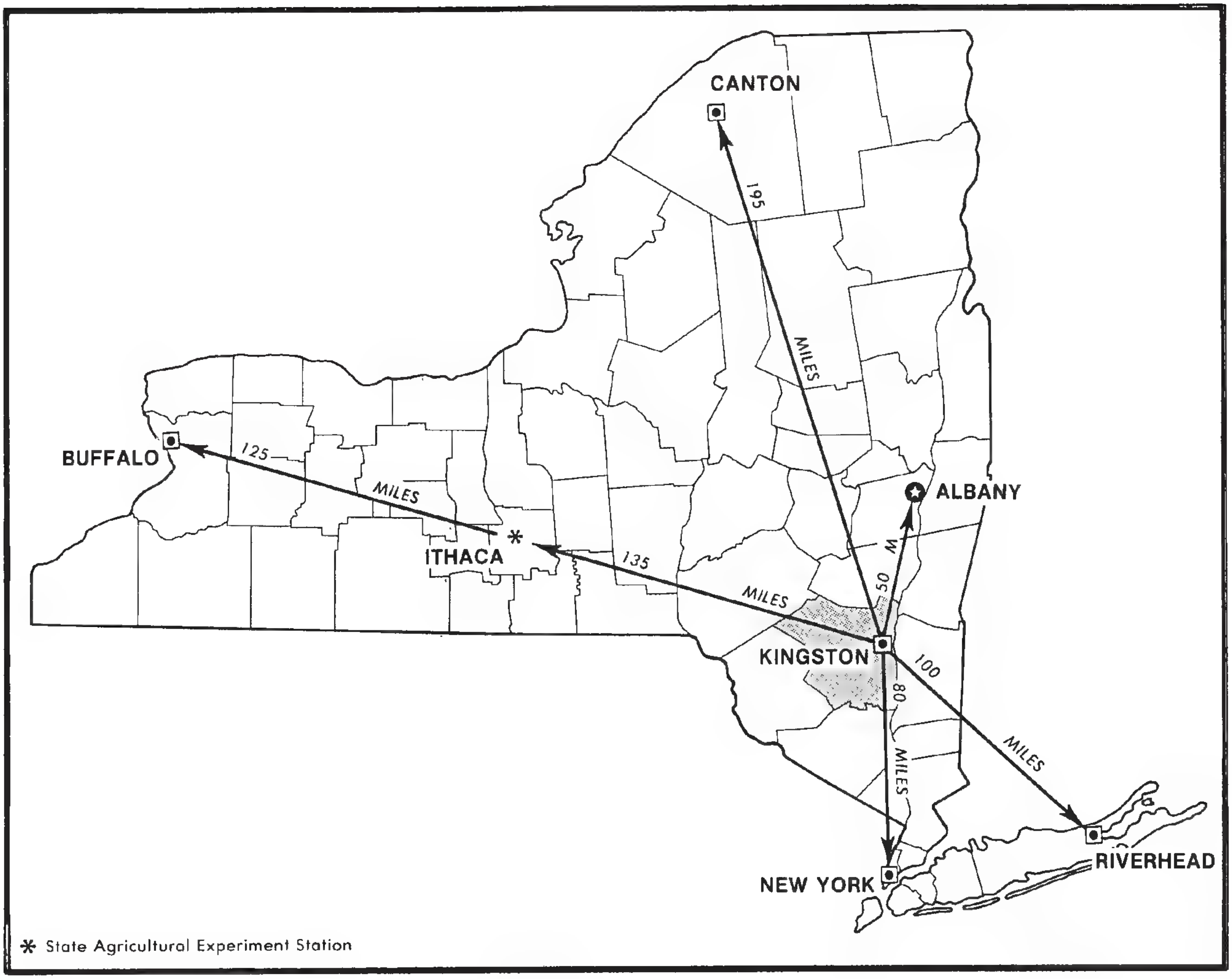

Location of Ulster County in New York

SOIL SURVEY OF ULSTER COUNTY, NEW YORK

By Lawrence A. Tornes, Soil Conservation Service

Fieldwork by James H. Brown, Leslie Crandall, Gary C. Nightingale, and Lawrence A. Tornes, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with Cornell University Agricultural Experiment Station

ULSTER COUNTY borders the west side of the Hudson River in the southeastern part of New York State (see map on facing page). It has a total area of 731,520 acres, or 1,143 square miles. Elevation ranges from sea level at the Hudson River to 4,204 feet on Slide Mountain in the Catskills. The Hudson River separates the survey area from Columbia and Dutchess Counties on the east. Ulster County is bounded by Greene and Delaware Counties on the north, by Orange and Sullivan Counties on the south, and by Sullivan and Delaware Counties on the west. Kingston, the county seat and largest city, has a population of about 25,544.

About 79 percent of Ulster County is in commercial and noncommercial forests (*9*). Most of the land in the Catskill, Shawangunk, and Marlboro Mountains is in forest. Only 12.5 percent of the county is in farms. Ulster County is the State's largest producer of apples and sweet corn for fresh market consumption and the second largest egg producer. Dairy products are also a large part of the agricultural output of the survey area.

Approximately 45 percent of the total land area in the county is in Catskill State Park. The State owns 131,437 acres of county land inside the park boundary. Several other state, county, and town parks are also in the county.

General nature of the county

This section provides general information about Ulster County. It discusses climate, physiography and bedrock geology, glacial geology, drainage, and water supply. It also provides information on history, farming, and transportation and industry.

Climate

In Ulster County, winters are cold and summers are moderately warm with occasional hot spells. Mountains are markedly cooler than the lowlands. Precipitation is well distributed throughout the year. In winter, snow occurs frequently, occasionally as blizzards; and snow covers the ground much of the time.

Normal rainfall is adequate for all crops, except for those on the shallow to bedrock soils and those on the excessively drained and somewhat excessively drained, moderately deep and deep soils that have low or very low available water capacity. Vegetables, orchards, and vineyards are irrigated on some farms during extended dry periods.

Orchards and vineyards are common in the southeastern part of the county, mainly because the length of the growing season and good air drainage are suited to these uses. In the mountainous parts of the county, snowfall generally occurs earlier in fall and later in spring than in the valleys, especially in the Catskill Mountains. In these areas this results in a shorter grazing season, a shorter growing season, and the planting of crops later in spring.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Mohonk Lake for the period 1951 to 1975. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 26 degrees F, and the average daily minimum temperature is 19 degrees. The lowest temperature on record, which occurred at Mohonk Lake on January 15, 1957, is -19 degrees. In summer the average temperature is 69 degrees, and the average daily maximum temperature is 77 degrees. The highest recorded temperature, which occured on July 3, 1966, is 97 degrees.

Growing degree days, shown in table 1, are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule

single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 24 inches, or 51 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 6.35 inches at Mohonk Lake on August 19, 1955. Thunderstorms occur on about 31 days each year, and most occur in summer.

Average seasonal snowfall is 68 inches. The greatest snow depth at any one time during the period of record was 35 inches. On the average, 50 days have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent in spring and 65 percent during the rest of the year. Humidity is higher at night, and the average at dawn is about 85 percent. The percentage of possible sunshine is 65 in summer and 35 in winter. The prevailing wind is from the west-southwest. Average windspeed is highest, 12 miles per hour, in March.

Climatic data in this section were specially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

Physiography and bedrock geology

Russell H. Waines, professor of geology, Department of Geological Sciences, State University College at New Paltz, New York and Bernard S. Ellis, senior staff geologist, Soil Conservation Service, helped to prepare this section.

Ulster County is within two main physiographic provinces of the Eastern United States. The northwestern half of the county lies in the Catskill Mountain area of the Appalachian Plateaus province, and the southeastern half lies in the Hudson Lowland area of the Valley and Ridge province (fig. 1). The physiography, relief, rock type, and rock structure in the county are somewhat interrelated.

The Catskill Mountain area is generally underlain by interbedded Devonian sandstone, siltstone, and shale formations that have very gentle inclinations toward the west and northwest. In Ulster County, the Catskill Mountain area can be divided into two regions. The Catskill Mountain region to the northwest is essentially an uplifted dissected plateau with elevations that range from about 1,400 feet in the lowest part to 4,204 feet at Slide Mountain in the southern part of the town of Shandaken. A lower region, lying between the Catskill Mountains and the Rondout-Esopus Valley region, also seems to be a dissected plateau with hilltop elevations that range from 500 feet in the north to 1,300 feet in the south.

The Hudson Lowland area is made up of a complex of six regions that differ in elevation, rock type, and rock structure. Throughout the area the rocks have been previously folded and faulted at least once during mountain building. In addition to sandstone, siltstone, and shale, limestone and quartz conglomerates are locally abundant in this area.

The Rondout-Esopus Valley region on the western margin of the area is a belt of folded and faulted Devonian and Silurian limestone, shale, and sandstone which underlie valley floors in places and form resistant ridges in places. Elevation ranges from sea level to about 500 feet.

The Shawangunk Mountain region, between the Rondout-Esopus Valley region and the Wallkill Valley region, is underlain by generally northwesterly-inclined, faulted and folded, highly resistant beds of Silurian quartz pebble conglomerate and sandstone. These form a caprock that overlies the less resistant shale and sandstone of the Wallkill Valley region to the southeast. Nearly vertical cliffs that are as much as 300 feet are commor. along the southeastern margin, and elevation ranges to almost 2,300 feet.

The Wallkill Valley region lies between the Shawangunk Mountain region to the west and the Marlboro Mountain region to the east. It is underlain by Ordovician strata; mainly shale and lesser amounts of siltstone and sandstone which have been folded and faulted twice. Elevation ranges from near sea level to more than 1,000 feet.

The Marlboro Mountain region is along the eastern margin of Ulster County, between the Hudson River and the Wallkill Valley region to the south and the northern extension of the Rondout-Esopus Valley region to the north. It formed in twice folded and faulted Ordovician sandstone, siltstone, and shale. Sandstone is especially common between the city of Kingston and the Orange County line where it underlies a series of ridges and hills which reach an elevation of 1,100 feet in the town of Lloyd.

A region lies between the southern part of the Wallkill Valley region and the Shawangunk Mountain region and is mainly in the western part of the town of Shawangunk. It is underlain by twice folded and faulted Ordovician sandstone, siltstone, and shale that are somewhat similar to those of the Marlboro Mountain region.

In the southeastern part of the town of Marlboro is an area of shale and siltstone that are similar to those in the Wallkill Valley region, and in the extreme southeastern corner of that town is a sequence of limestones of Cambro-Ordovician age.

This description of geological subdivisions of the Hudson Lowland area in Ulster County is largely based on the Geologic Map of New York State (*13*). The Devonian sequence is divided into about twenty formations; the Silurian, four; and the Ordovician, three. The Cambro-Ordovician is represented by one formation. The soil survey of Ulster County indicates that approximately 11 percent of the surface area of the county is either exposed bedrock or bedrock covered by less than 10 inches of soil.

Glacial geology

Ulster County was completely covered by a continental glacier, which probably reached maximum thickness about 27,000 years ago (*3*). All preglacial landforms were modified by this glaciation until the ice margin withdrew from the county about 14,000 years ago.

The present relief of the county tends to be more subdued than the preglacial relief. Depth of glacial erosion by abrasion, scouring, and plucking is notable in some instances but is mostly only slight (*5*). Deposition of glacial till directly from the ice has masked most of original bedrock relief.

Many of the preglacial valleys were filled by glaciolacustrine deposits overlain by glaciofluvial deposits. Generally, preglacial drainage systems were rearranged by such filling of valleys and blocking of outlets. Present drainage systems, while reflecting original patterns, have been extensively altered in some instances.

Most of Ulster County is blanketed by a ground moraine that was deposited directly from the base of the wasting ice sheet. Glaciofluvial, glaciolacustrine, and alluvial deposits are less extensive but are common at the lower elevations of the main valleys. Recessional moraines, kames and kame terraces, eskers, crevasse fillings, and other ice contact features occur in the county. Although they are of minor extent, they are locally important.

Most soils in the county formed directly in glacial or glacial-related deposits during the past 14,000 years. Since the greater part of till is derived from the bedrock over which it occurs, most of the soil series in the county are very closely related to bedrock type. However, soils that formed in glaciofluvial, glaciolacustrine, and alluvial deposits do not directly reflect the lithology of the underlying bedrock in most areas.

Drainage

Ulster County lies in two drainage basins, the Hudson and the Delaware. Most of the county is drained by rivers and streams that flow into the Hudson River, which forms the eastern boundary of the county. The major streams are the Esopus and Rondout Creeks and the Wallkill River (fig. 2). The Hudson River flows south; however, the lower reaches of the other streams tend to flow northeasterly. The northwestern part of the county, including most of the town of Hardenburgh and about two-thirds of the town of Denning, lies in the Delaware basin.

Water supply

Ground water of good quality can be obtained in sufficient quantity for individual home use in most places in Ulster County (*4*). Most people in rural areas obtain their water supply from drilled, driven or dug wells and some from developed springs. Approximately 50 percent of the population is served by public water systems that furnish water from reservoirs, wells, and the Hudson River.

The ground water resources are in sand and gravel deposits of glacial origin and in consolidated rock. The sand and gravel aquifers generally are small and restricted to the valley areas but are recharged rapidly and, therefore, yield large quantities of water. Aquifers with the most potential are in the valley from Wawarsing to south of Ellenville and at Ruby, Mount Marion, Veteran, and the confluence of the Saw Kill and Esopus Creek. Major parts of the Wallkill River and Esopus Creek valleys do not contain sand and gravel aquifers but are filled with relatively impermeable clay and silt.

Bedrock generally yields sufficient quantities of water for individual home or farm needs, but it is rarely dependable for large industrial or municipal supplies. Ground water obtained from the bedrock aquifers comes from fractures or cracks in the rock. The water-bearing properties of the various types of bedrock in the county are almost identical. The carbonate rock has the greatest possibilities of production.

Water obtained from the bedrock aquifers is generally of good chemical quality but is often moderately hard to very hard. Deeper wells in interlayered dark gray to black shale and sandstone frequently yield water that contains hydrogen sulfide. Iron and manganese are also troublesome chemical pollutants.

The Ashokan and Rondout Reservoirs and their accompanying aqueducts in the county are part of the New York City water supply system. Communities adjacent to the reservoirs and along the aqueducts are authorized to tap and use this water supply for residential purposes.

History

Five years after Henry Hudson sailed up the Hudson River in 1609 in search of a northwest passage, a small fort was built at the mouth of the Rondout Creek (*7*). This site became one of the first three trading posts established by the Dutch West India Company in New York. At this time the fertile banks of the Esopus Kill, Rondout Kill, and Wall Kill were lined with Indian corn planting grounds. The first settlement was at Hurley in about 1616. New Paltz was settled a little later. The early settlers were largely from Holland, but New Paltz was settled by the French Huguenots, who had an important influence in the development of the territory. Ulster was one of the original 12 counties into which the state was divided in 1683. The first State Constitution was adopted at Kingston in 1777. This village was burned by the British in the same year.

Ulster County has supported a number of important industires which have now either declined in importance or ceased to exist. In 1829, the Delaware and Hudson Canal from Honesdale, Pennsylvania to Rondout was opened to carry coal from the mines of Eastern Pennsyl-

vania to the tidewater on the Hudson River (*6*). This canal has been abandoned for a long time, but stretches of the old canal and many locks can be seen in many places throughout the county. During construction of the canal, natural cement was accidently discovered in Rosendale. When the industry was at its height, a dozen or more plants employed as many as 5,000 people. During this time Kingston had an important river freight business. In 1836, the first bluestone quarry was opened in Ulster County, and business developed until the annual output amounted to millions of dollars. Bluestone from the survey area now covers the walks and forms the lintels of doors and windows in many cities. Quarrying has declined because of the extensive use of cement. Clay along the Hudson River was excavated to produce millions of bricks. Ice cutting and tanning were also important industries in the 19th century.

In the past 50 years, farming has been discontinued in many areas and the farm residences converted to use as summer homes. Some of the larger residences were converted into hotels and boarding houses for summer boarders, but are no longer used for this purpose. Farms have also been purchased by the state for the Catskill State Park and by individuals and groups for hunting and fishing preserves.

Farming

Farming has been maintained in Ulster County despite decreases in the number of farms and in the acreage used. In 1969 12.5 percent of Ulster County was in farms (*12*). Of the 761 farms in the county, only 459 were classified as commercial. The land in farms included 42,351 acres of cropland, of which 12,097 acres was used only for pasture or grazing; 24,993 acres of woodland, including woodland pasture; and 12,140 acres in all other land, which consists of pasture other than cropland and woodland pasture and of land in house lots, barn lots, ponds, roads, and wasteland. Fruit, vegetable, dairy, and poultry are the main farm enterprises. Ulster County ranks first in the production of apples and sweet corn for fresh market consumption in the state and second in egg production.

The number of abandoned farms has steadily increased over the years. The number of farms decreased from 1,460 in 1959 to 761 in 1969. The size of the individual farm increased from 110.9 to 120.3 acres during this period.

The dominant crops are fruits, hay, field corn, and vegetables. In 1969, 14,947 acres was used for orchards; 14,054 acres for hay; and 3,043 acres for vegetables. Total acreage in field corn was 4,495, of which 2,753 acres was used for silage. Sweet corn, the dominant vegetable, is grown in the Esopus, Rondout, and Wallkill valleys. The orchards are concentrated in the southeastern part of the county.

The number of dairy cows decreased from 7,694 in 1959 to 4,719 in 1969. The number of chickens and sheep has remained the same during this period, but that of beef cattle and hogs has decreased. The number of horses and ponies has gradually increased.

Transportation and industry

Transportation is supplied by a system of roads and railroads and by water. The New York State Thruway in the eastern part of the county with three interchanges makes the county readily accessible to the principal population centers of the northeast. Four rail lines in the county provide freight service. The Hudson River provides a water route for economical transportation of such bulk cargo as crushed stone, lightweight aggregate, cement, and petroleum products. The principal docking facilities are at Rondout Harbor and East Kingston. Ulster County has no scheduled commercial airline facilities, but an airport is 6 miles south of Ulster County in Orange County.

The major industries of the county are the manufacture of data processing, electronic, magnetic, and precision cooling equipment and of TV antennas and explosives. Quarrying for materials used in road building and manufacturing of cement and for lightweight aggregate has been a long-time industry in the county.

Tourism is a major industry. Thousand of acres of state land in the Catskill and Minnewaska State Parks offer outstanding opportunities for hunting, fishing, hiking, and skiing. The beautiful mountains provide spectacular views. Facilities include hotels, motels, boarding houses, bungalow colonies, and state and private campgrounds.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The general soil map units in Ulster County are discussed on the following pages. The terms for texture used in the introductory statement to describe the map units apply to the surface layer textures of the major soils in the unit. The terms for drainage class used in the introductory statement also apply to only the major soils.

1. Bath-Nassau

Deep and shallow, well drained and somewhat excessively drained, dominantly hilly, medium textured soils underlain dominantly with shale; on uplands

This unit consists of soils that formed in deep and shallow glacial till deposits. The landscape is a series of knolls, ridges, and low hills that have irregular or rolling relief (fig. 2). This type of landscape is the result of the underlying shale, siltstone, and slate bedrock being folded and tilted at various angles. Ridges associated with the bedrock occur frequently and extend in a general northeast-southwest direction. Slope is mostly 8 to 25 percent but ranges from 3 to 65 percent.

This unit occupies about 19 percent of the county. Bath soils make up about 35 percent of the unit and Nassau soils about 25 percent. Soils of minor extent make up the remaining 40 percent.

The Bath soils formed in glacial till deposits derived mostly from sandstone, siltstone, and shale. These soils are deep, well drained, and have a medium textured surface layer. They have a medium or moderately coarse textured subsoil and substratum. A dense fragipan that restricts rooting starts at a depth of 26 to 38 inches. Water movement is moderate through the surface layer and upper part of the subsoil but slow in the fragipan and substratum. These gently sloping to very steep soils occupy convex inter-ridge areas.

The shallow, somewhat excessively drained, medium textured Nasau soils formed in glacial till derived mainly from shale and slate. They are underlain by shale or slate bedrock at a depth of 10 to 20 inches. Water movement is moderate throughout the soil. These gently sloping to moderately steep soils occur on the sides and tops of ridges that are affected by the bedrock.

Soils of minor extent in this unit are the Manlius, Mardin, Volusia, Lyons, Palms, Plainfield, Riverhead, Valois, and Churchville soils, and areas of Rock outcrop. The well drained to excessively well drained Manlius soils are intermingled with the major soils where bedrock is 20 to 40 inches below the soil surface. The moderately well drained Mardin soils and somewhat poorly drained Volusia soils are similar to the deep Bath soils

but are in lower and wetter areas of the landscape. The poorly drained and very poorly drained Lyons soils are in depressions and concave flats containing glacial till deposits. The very poorly drained Palms muck is in a few bogs and swamps that contain organic deposits. The excessivley drained Plainfield soils and well drained Riverhead soils are on terraces, ridges and low rounded hills of sandy glacial outwash deposits. The deep, well drained Valois soils are in a few areas. They are similar to Bath soils but do not have a restrictive fragipan. The somewhat poorly drained Churchville soils are where silty lake-laid deposits mantle a few areas of the glacial till plain. Rock outcrops commonly protrude along ridge crests.

This map unit is commonly used for orchards, meadow crops and pasture. The rolling or hilly topography and rock outcrops are limtiations for cultivated crops. Because of the tilted underlying bedrock, available water capacity is quite variable within short distances. Steeper areas of this unit are mostly wooded. Many homes have been constructed in the lesser sloping areas. Community developments are limited by the slope, variable depth to bedrock, and slow water movement through the fragipan in the deeper soils of this unit.

2. Stockbridge-Farmington-Bath

Deep and shallow, well drained and somewhat excessively drained, dominantly hilly, medium textured soils underlain dominantly with limestone; on uplands

This unit consists of soils that formed in glacial till deposits of variable depth overlying bedrock. The landscape is a series of knolls and ridges cored with limestone bedrock. The ridges are oriented in a general northeast-southwest direction. Slope is dominantly 8 to 25 percent but ranges from 3 to 35 percent.

This unit covers about 3.5 percent of the county. Stockbridge soils make up about 20 percent of the unit, Farmington soils about 20 percent, and Bath soils 20 percent. Soils of minor extent make up the remaining 40 percent.

The Stockbridge and Farmington soils formed in glacial till deposits that are similar and derived mainly from limestone rock and a smaller component of shale, siltstone, and sandstone. The Bath soils formed in till derived chiefly from sandstone, siltstone, and shale with little or no component of limestone.

The Stockbridge soils are deep, well drained, and medium textured. Water movement through the surface layer and subsoil is moderate, but in the substratum it is slow. These gently sloping to hilly soils are in convex inter-ridge areas that receive little runoff.

The Farmington soils are shallow, well drained and somewhat excessively drained, and medium textured. Bedrock, generally limestone, is at a depth of 10 to 20 inches. Water movement through the soil is moderate. These gently sloping to steep soils are on the sides and tops of bedrock-cored ridges.

The Bath soils are deep, well drained, and have a medium textured surface layer. They have a medium textured or moderately coarse textured subsoil and substratum. A dense fragipan starts at a depth of 26 to 38 inches. Water movement through the soil layers above the pan is moderate, and in the fragipan it is slow. These gently sloping to steep soils are on convex hilltops, ridges and knolls.

Soils of minor extent include the Mardin, Volusia, Nassau, Lyons, Raynham, Lamson, Canandaigua, Rhinebeck, and Riverhead series, and areas of Rock outcrop. The moderately well drained Mardin soils and somewhat poorly drained Volusia soils are on foot slopes and flats that commonly receive runoff from higher adjacent soils. These soils formed in glacial till deposits and have a fragipan. The somewhat excessively drained Nassau soils are in areas where shale bedrock is at a depth of 10 to 20 inches. The poorly drained and very poorly drained Lyons soils formed in glacial till deposits in depressions and along drainageways. The somewhat poorly drained Raynham soils are in a few areas of silty lake-laid deposits. The poorly drained and very poorly drained sandy Lamson soils and silty Canandaigua soils are in depressions and on low flats containing stone-free, lake-laid deposits. The somewhat poorly drained Rhinebeck soils are in a few areas of clayey lake deposits. The Riverhead soils are well drained and are on benches and knolls containing sandy glacial outwash deposits. Ledges of limestone outcrop are along crests of ridges and are intermingled with the shallow Farmington soils. A soil that is similar to Farmington but is 20 to 40 inches deep over bedrock is in numerous areas.

Many areas of this map unit are in woodland. A few areas are used for hay or pasture. Depth to bedrock, rock outcrops, slope, slow water movement through the fragipan or substratum in the deep soils, and the pollution hazard to underground water supplies in the shallow soils are concerns for community developments.

3. Wellsboro-Wurtsboro-Swartswood

Deep, moderately well drained and well drained, dominantly gently sloping, moderately coarse textured and medium textured, very bouldery soils; on uplands

This unit consists of very stony soils that have a fragipan and formed in glacial till deposits. The landscape is mainly broad, smooth hills, ridges, and valley sides on the plateau adjacent to the Catskill Mountains. Most areas are very bouldery. Stones and boulders are about 3 to 30 feet apart on the surface. Slope is dominantly 3 to 8 percent but ranges from 3 to 35 percent.

This unit covers about 6 percent of the county. Wellsboro soils make up about 25 percent of the unit, Wurtsboro soils about 25 percent, and Swartswood soils about

20 percent. Soils of minor extent make up the remaining 30 percent.

The Wellsboro soils formed in reddish glacial till deposits derived from sandstone, siltstone, and shale. They are deep, moderately well drained, and have a medium textured surface layer and upper part of the subsoil. The lower part of the subsoil and substratum is medium textured or moderately coarse textured. A dense fragipan starting at a depth of 15 to 25 inches restricts root penetration and the downward movement of water. A seasonal high water table is perched above the pan early in spring. Water movement in the soil layers above the pan is moderate. These gently sloping and sloping soils have smooth convex slopes and commonly receive runoff from adjacent higher soils.

The Wurtsboro soils formed in brownish glacial till deposits derived from sandstone, quartz, and conglomerate. They are deep, moderately well drained, and have a medium textured surface layer and medium textured or moderately coarse textured subsoil and substratum. A dense fragipan starts at a depth of 17 to 28 inches. Water movement in the soil layers above the pan is moderate and in the fragipan and substratum it is slow. A seasonal high water table is perched above the fragipan for brief periods in spring. These gently sloping soils have smooth convex slopes and commonly receive some runoff from higher adjacent soils.

The Swartswood soils formed in glacial till deposits similar to that of Wurtsboro soils. They are deep, well drained, and have a moderately coarse textured surface layer. The subsoil and substrata are moderately coarse textured or medium textured. A dense fragipan that restricts root penetration starts at depth of 20 to 36 inches. Water movement through the soil layers above the pan is moderate, and in the fragipan and substratum it is moderately slow or slow. These gently sloping to steep soils are on convex ridge crests and hillsides, generally above the slightly wetter Wurtsboro soils.

Soils of minor extent in this unit include the Lackawanna, Morris, Scriba, Menlo, Arnot, Lordstown, Oquaga, Tuller, Bath, Valois, and Hoosic series and occasional areas of Rock outcrop. The well drained Lackawanna soils are on the higher parts of the landscape associated with Wellsboro soils. The somewhat poorly drained Morris soils are on foot slopes below with the better drained Wellsboro soils. The somewhat poorly drained Scriba soils occupy concave foot slopes, and very poorly drained Menlo soils are in depressions and along drainageways in areas of better drained Wurtsboro soils. The somewhat excessively drained to moderately well drained Arnot soils are in areas where bedrock is at a depth of 10 to 20 inches. The brownish, well drained Lordstown soils, and reddish, well drained to excessively drained Oquaga soils formed in a few areas where bedrock is at a depth of 20 to 40 inches. The somewhat poorly drained to poorly drained Tuller soils are in low areas and are underlain with bedrock at a depth of 10 to 20 inches. The well drained, brownish Bath soils are in areas where the fragipan has a relatively high silt content. The well drained Valois soils do not have a fragipan and generally are along lower valley sides. The somewhat excessively drained Hoosic soils are on terraces, benches, and small rounded hills containing gravelly glacial outwash deposits. Rock outcrop occasionally protrudes along the steepest parts of hillsides and ridge crests.

Many areas of this unit are in woodland. A few areas are used for hay and permanent pasture. The large number of stones and boulders on the surface makes the operation of farm machinery extremely difficult for crop production and pasture renovation. Temporary seasonal wetness in many areas, surface boulders, slow water movement through the fragipan, and slope in some areas are the main limitations for community developments. Improvement of wildlife habitat has potential in numerous areas.

4. Arnot-Oquaga-Lackawanna

Shallow to deep, excessively drained to moderately well drained, dominantly very steep, medium textured soils; on uplands

This unit is in the Catskill Mountains and consists of soils that formed in glacial till deposits of variable thickness over bedrock. The landscape is mainly hills that are affected by the underlying bedrock and mountainsides that have a slight stairstep appearance because of the underlying rock. Many areas are very bouldery. Slope is dominantly 35 to 55 percent but ranges from 8 to 90 percent.

This is the largest unit on the general soil map. It covers about 39 percent of the county. Arnot soils make up about 30 percent of the unit, Oquaga soils about 25 percent, and Lackawanna soils about 15 percent. Soils of minor extent make up the remaining 30 percent.

The Arnot, Oquaga, and Lackawanna soils formed in glacial till deposits that are similar and derived mainly from reddish sandstone, siltstone, and shale.

The Arnot soils are shallow, somewhat excessively drained to moderately well drained, and medium textured. Bedrock underlies these soils at a depth of 10 to 20 inches. In some areas the bedrock perches water in the subsoil for brief periods early in spring. Water movement through the soil material is moderate. These sloping to very steep soils are on the upper part of side slopes and on mountain tops.

The Oquaga soils are moderately deep, well drained to excessively drained, and medium textured. Sandstone, siltstone, and shale bedrock underlies these soils at a depth of 20 to 40 inches. Water movement through the soil is moderate. These sloping to very steep soils are on mountainsides and hillsides that commonly have a "step-tread" appearance.

The Lackawanna soils are deep, well drained, and medium textured. They have a dense fragipan starting at a depth of 17 to 36 inches that restricts rooting. Water movement is moderate in the soil layers above the pan and slow in the fragipan and substratum. Most areas are very bouldery. These sloping to very steep soils commonly are on valley sides and mountainsides at the base of "step-risers."

Soils of minor extent include the Lordstown, Tuller, Swartswood, Wurtsboro, Wellsboro, Mardin, Valois, Tunkhannock, Hoosic, Barbour, and Suncook series. Large areas of Rock outcrop and areas of Alluvial land are also included in this unit. Numerous areas of the well drained Lordstown soils are where the glacial till deposits are brownish and 20 to 40 inches deep over rock. The somewhat poorly drained to poorly drained Tuller soils are in depressions and along seep spots. The deep, well drained Swartswood soils and moderately well drained Wurtsboro soils are in areas dominated by moderately coarse textured glacial till deposits. The moderately well drained Wellsboro soils are associated with Lackawanna soils on foot slope. The moderately well drained Mardin soils are in areas dominated by brownish glacial till deposits. The well drained Valois soils do not have a fragipan, which is common in the deep, upland soils, and mainly are along lower valley sides. The well drained to somewhat excessively drained, gravelly Tunkhannock soils and somewhat excessively drained, gravelly and sandy Hoosic soils are on glacial outwash benches and knolls along narrow valley floors. The well drained, medium textured to moderately coarse textured Barbour soils and excessively drained, coarse textured Suncook soils are on alluvial flood plains along streams that issue from upland areas of this unit. Unclassified areas of Alluvial land occur along many of the smaller streams. Rock outcrops are numerous, particularly in nearly vertical areas along mountainsides and valley sides. Many areas of this map unit have soils less than 10 inches thick over bedrock, particularly on the face of "step-risers."

Most areas of this map unit are in woodland and provide habitat for wildlife. Shallowness to bedrock, steep slopes, rock outcrops, surface boulders, and slow water movement through the fragipan layer in the deep soils are the main limitations for farm and community developments. This unit has good potential for recreational uses such as hiking and camping. Many areas afford scenic overlooks.

5. Lordstown-Arnot-Mardin

Shallow to deep, somewhat excessively drained to moderately well drained, dominantly sloping, medium textured soils; on uplands

This unit occurs on the foothills adjacent to the Catskill Mountains. The dominant soils formed in glacial till deposits of variable thickness over bedrock. The landscape is dominantly hilltops, hillsides, and ridges that are affected by the bedrock. Side slopes commonly have a stairstep appearance because of the underlying bedrock. Many areas have large stones and boulders on the surface. Slope is mainly 3 to 15 percent but ranges from 0 to 35 percent.

This unit covers about 19 percent of the county. Lordstown soils make up about 25 percent of the unit, Arnot soils about 25 percent, and Mardin soils about 10 percent. Soils of minor extent make up the remaining 40 percent.

The Lordstown, Arnot, and Mardin soils formed in glacial till deposits that are similar and derived mainly from brownish siltstone, shale, and sandstone.

The Lordstown soils are moderately deep, well drained and medium textured. Bedrock is at a depth of 20 to 40 inches. Water movement through the soil layers is moderate. These gently sloping to steep soils are on the "step-tread" part of side slopes, on hilltops, and on the lower part of hillsides.

The Arnot soils are shallow, somewhat excessively drained to moderately well drained, and medium textured. Bedrock underlies these soils at a depth of 10 to 20 inches. Water movement through the soil layers is moderate. In some areas a seasonal high water table is perched above the bedrock for brief periods early in spring. These nearly level to steep soils are on hilltops, ridge crests, and short slope breaks or steprisers.

The Mardin soils are deep, moderately well drained, and medium textured. A dense fragipan that restricts rooting and causes a perched seasonal high water table early in spring starts at a depth of 14 to 26 inches. Water movement through the soil layers above the fragipan is moderate, but in the fragipan and substratum it is slow. These gently sloping and sloping soils are on foot slopes and slightly concave side slopes. Runoff is commonly received from higher adjacent soils.

Soils of minor extent in this unit include the Nassau, Manlius, Volusia, Bath, Wellsboro, Lyons, Tuller, Chenango, and Wayland series. Areas of Rock outcrop are also included. The shallow, somewhat excessively drained Nassau soils and moderately deep, well drained to excessively drained Manlius soils are in areas dominated by till deposits high in shale content and underlain with shale bedrock. The somewhat poorly drained Volusia soils are similar to Mardin soils, but wetter, and are on toe slopes and flats. The well drained Bath soils are similar to Mardin soils but occupy higher areas that receive very little runoff. The moderately well drained Wellsboro soils are in a few areas where the glacial till deposits are reddish. The poorly drained and very poorly drained Lyons soils are in a few low depressions. The Tuller soils are in occasional wet flat spots and depressions on hilltops where bedrock is at a depth of 10 to 20 inches. The well drained to somewhat excessively drained Chenango soils are in dissecting valleys. They are on benches and small rounded hills in gravelly gla-

cial outwash deposits. The poorly drained and very poorly drained Wayland soils are on nearly level flood plains along a few streams that cross this unit. Areas of Rock outcrop are intermingled with Arnot soils on slope breaks or along the crest of hills and ridges. A few areas of very steep Arnot and Lordstown soils are along valley sides and on steeper hillsides.

Most areas of this unit are in woodland and provide cover for certain species of wildlife. A few areas are in pasture or hay crops. Depth to bedrock in most areas, rock outcrops, surface boulders, and the restrictive fragipan in the deep Mardin soils are the main limitations for farm and community developments. Some areas have good potential for recreational uses.

6. Churchville-Rhinebeck-Madalin

Deep, somewhat poorly drained to very poorly drained, dominantly gently sloping, medium textured and moderately fine textured soils; on lowland plains

This unit occurs on former glacial lakebeds. The dominant soils formed in coarse fragment-free glacial lake deposits high in content of silt and clay. The landscape is a broad plain interrupted by low knolls and ridges and dissecting drainageways. Slope is mainly 0 to 8 percent but ranges to as much as 25 percent in a few areas.

This unit covers about 4.5 percent of the county. Churchville soils make up about 25 percent of the unit, Rhinebeck soils about 20 percent, and Madalin soils about 15 percent. Soils of minor extent make up the remaining 40 percent.

The Churchville soils formed in a relatively thin mantle of lake-laid deposits of clay and silt overlying glacial till deposits. These soils are deep, somewhat poorly drained and have a medium textured surface layer. The subsoil is moderately fine textured or fine textured, and the substratum is medium textured or moderately fine textured. Water movement through the subsoil is slow or very slow. In the glacial till substratum, starting at a depth of 20 to 40 inches, water movement is slow or moderately slow. A seasonal high water table is perched in the upper part of the subsoil early in spring. These nearly level to gently sloping soils are on broad, slightly undulating flats and low smooth ridges.

The Rhinebeck and Madalin soils formed in coarse fragment-free glacial lake deposits that are similar and dominated by clay and silt. Rhinebeck soils are deep, somewhat poorly drained, and have a medium textured surface layer. The subsoil is fine textured or moderately fine textured. Water movement through the subsoil and substratum is slow. A seasonal high water table is perched in the upper part of the subsoil during spring and other excessively wet periods. These nearly level and gently sloping soils are on broad flats, low ridges, and along shallow drainageways.

The Madalin soils are deep, poorly drained and very poorly drained, and have a moderately fine textured surface layer. The subsoil is moderately fine textured or fine textured. Water movement through the subsoil and substratum is slow. A seasonal high water table is perched just below the soil surface for prolonged periods during the wettest parts of the year. These nearly level soils are in low basinlike areas and depressions.

Soils of minor extent include the Cayuga, Hudson, Canandaigua, Raynham, Bath, Volusia, Nassau, Tioga, and Wayland series. The well drained and moderately well drained Cayuga soils are similar to Churchville soils but are on a few higher, better drained knolls and ridges. The moderately well drained and well drained Hudson soils are on knolls and side slopes of dissecting drainageways in areas of deep lake-laid deposits. The poorly drained and very poorly drained Canandaigua soils, and somewhat poorly drained Raynham soils are similar to Madalin and Rhinebeck soils but are in areas where the lake deposits have a lower clay content. The well drained Bath soils and somewhat poorly drained Volusia soils are on islandlike areas of glacial till deposits that protrude above the adjacent lowland lake plain. The somewhat excessively drained Nassau soils are in a few areas where bedrock is at a depth of 10 to 20 inches. The well drained Tioga soils and poorly drained and very poorly drained Wayland soils are on flood plains adjacent to a few streams that cross this unit.

Some areas of this unit are farmed. Many areas that were once used for row crops are now in hay crops or pasture. Other areas are in brush and woodland. Surface and subsurface drainage are principal concerns in management for the production of row crops. Seasonal wetness, slow or very slow internal water movement, and instability of the clayey and silty lake-laid sediment are the principal concerns for community developments. Some areas of this unit have good potential for dugout ponds and wetland wildlife habitat.

7. Hoosic-Schoharie-Chenango

Deep, somewhat excessively drained to moderately well drained, dominantly gently sloping, moderately coarse textured to moderately fine textured soils; in valleys and on plains

This unit consists of soils that formed in glacial outwash deposits high in content of sand and gravel, and in glacial lake deposits high in content of silt and clay. The landscape is a series of benches and terraces along valley bottoms; low, complex, sloping hills along lower valley sides; and occasional dissected rolling plains. Slope is mostly 3 to 15 percent but ranges from 0 to 55 percent.

This unit covers about 9 percent of the county. Hoosic soils make up about 35 percent of the unit, Schoharie soils about 10 percent, and Chenango soils about 10 percent. Soils of minor extent make up the remaining 45 percent.

The Hoosic and Chenango soils formed in glacial outwash deposits that are similar and have a high content of sand and gravel.

The Hoosic soils are deep, brownish colored, somewhat excessively drained, and have a medium textured or moderately coarse textured surface layer. The subsoil is medium textured to coarse textured. The substratum is commonly stratified sand and gravel. Water movement through the surface layer and subsoil is moderately rapid, and in the substratum it is rapid or very rapid. These nearly level to very steep soils are on low, complex sloping hills and ridges and on benches and terraces in valleys. A few areas of Hoosic soils are on outwash plains.

The Schoharie soils formed in coarse fragment-free glacial lake deposits dominated by clay and silt. They are deep, moderately well drained and well drained, and have a medium textured or moderately fine textured surface layer. The subsoil is fine textured or moderately fine textured, and the substratum is commonly varved silt and clay. Water movement through the subsoil and substratum is slow or very slow. In lesser sloping areas, a temporary seasonal high water table is perched in the lower part of the subsoil early in spring. These gently sloping to steep soils are on low convex ridges and knolls and on side slopes adjacent to dissecting drainageways.

The Chenango soils are deep, brownish colored, well drained to somewhat excessively drained, and have a medium textured surface layer. The gravelly or very gravelly subsoil is medium textured or moderately coarse textured. The substratum is dominantly stratified sand and gravel. Water movement through the surface layer and subsoil is moderate or moderately rapid, and in the substratum it is rapid. These nearly level to sloping soils are on ridges, benches, and terraces along valley floors and on undulating plains.

Soils of minor extent include the Tioga, Middlebury, Hamlin, Barbour, Wayland, Haven, Tunkhannock, Red Hook, Atherton, Unadilla, Raynham, Hudson, Odessa, and Valois soils. The well drained Tioga soils, and moderately well drained to somewhat poorly drained Middlebury soils are on alluvial flood plains adjacent to major streams traversing this unit. The well drained Hamlin and Barbour soils are on flood plains along some valley bottoms. The Hamlin soils are in alluvial deposits that have higher content of silt than Tioga soils, and Barbour soils are redder than Hamlin or Tioga soils. The poorly drained and very poorly drained Wayland soils are in low areas and slack water areas on flood plains along many streams. The well drained Haven soils are on a few benches and do not have the high gravel content of Hoosic soils. The well drained to somewhat excessively drained Tunkhannock soils are in many areas where the glacial outwash deposits are redder than in the similar, but more brownish, Chenango soils. The somewhat poorly drained Red Hook and poorly drained and very poorly drained Atherton soils are on low benches and are in depressions and potholes containing gravelly glacial outwash deposits. The well drained Unadilla soils and somewhat poorly drained Raynham soils are in areas of coarse fragment-free silty deposits. The moderately well drained and well drained Hudson soils are similar to reddish Schoharie soils, but they are in areas dominated by grayish glacial lake deposits. The somewhat poorly drained Odessa soils are similar to Schoharie soils, but wetter, and are on foot slopes and low flats. The well drained Valois soils are along lower valley sides where glacial till deposits overlie or merge with lower glacial outwash deposits; they are similar to, but do not have the high gravel content of Hoosic and Chenango soils.

Most areas of this unit are openland that is used for orchards, cultivated crops, hay, and pasture. Droughtiness and hazard of pollution of underground water supplies are the main limitations in the use of the gravelly Hoosic and Chenango soils. Slow or very slow internal water movement, temporary seasonal wetness, and instability are the chief concerns for most uses of the clayey Schoharie soils. Some areas, particular areas of Hoosic and Chenango soils, have good potential for community development but careful site selection is important. Alluvial soils, such as Tioga, on flood plains adjacent to streams that traverse this unit should be avoided for residential development.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a profile that is almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the

soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Chenango gravelly silt loam, 3 to 8 percent slopes, is one of several phases within the Chenango series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes and undifferentiated groups.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Bath-Nassau complex, 8 to 25 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them. Hudson and Schoharie silty clay loam, 8 to 15 percent slopes, severely eroded, is an undifferentiated group in this survey area.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Fresh water marsh is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 4, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

AA—Alluvial land. This map unit consists of deep, unconsolidated alluvium that is commonly shifted or redeposited by stream overflow. The soil pattern is so variable that to establish a separate soil series is not practical. Texture varies widely within a short distance, and the soil has little or no profile development. Many areas are gravelly, very gravelly, cobbly, or stony. Drainage is excessive to very poor. Most areas are adjacent to small streams in the mountains and are flooded several times each year. Areas are mainly long and narrow in shape and are 5 to 300 acres in size.

Frequent flooding and the variability of texture and drainage within short distances severely affect most uses. Most of the acreage is wooded and supports water-tolerant trees, such as willow, sycamore, and cottonwood. Cleared areas are mainly in pasture or are idle and reverting to brush and weeds. Alluvial land has poor potential for farming and for urban and recreational uses. It is generally a poor source of sand and gravel. Capability subclass Vw.

AcB—Arnot channery silt loam, 0 to 8 percent slopes. This shallow, somewhat excessively drained and moderately well drained, nearly level and gently sloping soil formed in glacial till. It is on ridgetops and benches where relief is affected by bedrock. Most areas are long and narrow in shape and are 5 to 20 acres in size.

Typically, the surface layer is very dark grayish brown channery silt loam about 7 inches thick. The subsoil is friable, dark yellowish brown, very channery silt loam. Gray sandstone bedrock is at a depth of 17 inches.

Included with this soil in mapping are areas of Tuller soils that are wetter than this Arnot soil along drainageways and in narrow depressions; narrow strips of Lordstown and Oquaga soils in some areas where bedrock is at a depth of 20 to 40 inches; and large areas of a soil that is similar to this Arnot soil but has less coarse fragments throughout. Also included are areas of soils that have a gravelly fine sandy loam subsoil where the bedrock is quartz pebble conglomerate and sandstone and a few areas of rock outcrop, most of which are shown on the soil map by a rock outcrop symbol.

This soil can have free water above the bedrock for brief periods in spring and after heavy rains. The root zone consists of 10 to 20 inches of well aerated soil material over bedrock. A few roots may penetrate fractures in the bedrock. Available water capacity is very low, and plants wilt quickly during dry periods. Permeability is moderate. Runoff is slow to medium. In unlimed areas, reaction is extremely acid to medium acid throughout the soil.

Most of the acreage of this soil is used for long term hay, pasture, and woodland. This soil has fair potential for farming and for most recreational uses, but it has poor potential for community development.

This soil is suited to row crops, hay, and pasture. Grain crops that mature early and shallow-rooted plants

that can tolerate dryness are better suited than most other crops. Flat stone fragments hinder tillage and harvesting. The hazard of erosion and loss of moisture through runoff are moderate concerns. Conserving moisture, improving tilth, and maintaining the content of organic matter are needed. Such practices as minimum tillage, use of cover crops, incorporating crop residue into the soil, crop rotation, and tillage at the proper moisture condition can be used. The use of lime and fertilizers is also important in management.

Woodland productivity is poor. Machine planting of tree seedlings is practical on this soil. Seedling mortality is high because of droughtiness of the soil.

The shallow depth to bedrock severely limits most community development. Effluent from septic tank absorption fields seeps over the bedrock and comes to the surface at rock outcrop or in very shallow areas. A vegetative cover maintained on the site helps to prevent erosion. This soil has potential for some recreational uses, even though the shallow depth to bedrock and flat stone fragments can present hazards for some uses. Capability subclass IIIe.

ARD—Arnot-Lordstown-Rock outcrop complex, moderately steep. This map unit consists of shallow, somewhat excessively drained and moderately well drained Arnot soils; moderately deep, well drained Lordstown soils; and exposed bedrock. These very bouldery soils formed in glacial till. The relief is affected by bedrock. The surface generally has a stairstep appearance. The Arnot soils are on narrow benches and on the upper part of slopes where the till mantle is 10 to 20 inches thick. The Lordstown soils are at the base of slopes and on the wider benches where the till mantle is 20 to 40 inches thick. Sandstone and siltstone bedrock outcrops are generally on the risers between benches. Slope ranges from 15 to 25 percent. Areas on the Shawangunk Mountains are broad and irregular in shape and are 15 to more than 300 acres in size. Those on the plateau adjacent to the Catskill Mountains are long and narrow in shape and are 15 to 150 acres in size.

This unit is made up of about 35 percent Arnot very bouldery silt loam and very bouldery loam, 30 percent Lordstown very bouldery silt loam and very bouldery loam, 20 percent Rock outcrop, and 15 percent other soils. These soils and the Rock outcrop are in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Arnot soil in a wooded area is very dark grayish brown, very bouldery silt loam about 2 inches thick. The subsoil extends to a depth of 14 inches. It is friable, yellowish brown, very channery loam. Thick-bedded gray sandstone and siltstone bedrock is below a depth of about 14 inches.

Typically, the surface layer of the Lordstown soil is dark brown, very bouldery silt loam 4 inches thick. The friable, yellowish brown subsoil extends to a depth of 32 inches. It is channery silt loam in the upper part and channery loam in the lower part. Thick-bedded gray sandstone and siltstone bedrock is at a depth of about 32 inches.

Included with this unit in mapping are Swartswood, Bath, Valois, and Hoosic soils that are intermingled with the Lordstown soils where the soil mantle is deep to bedrock; small areas of Tuller and Scriba soils that are in seeps and along drainageways; many areas of soils that have slopes of 25 to 35 percent; and some areas of soils on narrow benches that have slopes of 3 to 15 percent. Some included areas are nonbouldery, and a few areas have small spots of quarry rubble. Also included are large areas of soils that are similar to the Arnot and Lordstown soils but have a gravelly loam to gravelly sandy loam subsoil where the bedrock is quartz pebble conglomerate and sandstone.

The Arnot soil can have free water above the bedrock for periods in spring and after heavy rains. The root zone consists of 10 to 20 inches of well aerated soil over bedrock. A few roots penetrate fractures in the bedrock in some areas. Available water capacity is very low, and plants wilt quickly during dry periods.

Free water is occasionally above the bedrock for brief periods in the Lordstown soils after very rainy periods, but it is generally below a depth of 6 feet. The root zone consists of 20 to 40 inches of soil over bedrock. Available water capacity is low to moderate.

Permeability is moderate in both soils. Runoff is very rapid. Boulders are mainly 2 to 6 feet across and 1 to 2 feet thick, but many are smaller and a few are larger. Distance between boulders varies but is generally 5 to 30 feet. Boulders cover 0.1 to 3 percent of the surface of these soils. In unlimed areas, the Arnot soils are extremely acid to medium acid in the surface layer and subsoil. The surface layer and the subsoil of the Lordstown soils are very strongly acid or strongly acid.

Most areas of this map unit are used for woodland and for wildlife habitat. The unit has poor potential for farming and for urban uses, but has potential for some recreational uses, such as hiking.

Slope, rock outcrops, boulders, and moderately deep and shallow depth to bedrock are very severe limitations for farming. Some areas can be used for unimproved pasture.

Woodland productivity is poor on the Arnot soils and moderately high on the Lordstown soils. New plantations are difficult to establish. Drainage dips or water bars are needed to protect logging roads and skid trails from erosion.

The moderate and shallow depth to bedrock, slope, rock outcrops, and boulders make construction for urban and recreational uses extremely difficult. A few esthetic homesites are available but sites for sewage disposal are very limiting. The hazard of erosion is severe where vegetation is removed. Establishing trails in recreational

areas across the slope wherever possible helps to protect them from erosion. Capability subclass VIIs.

ARF—Arnot-Oquaga-Rock outcrop complex, very steep. This map unit consists of a shallow, somewhat excessively drained and moderately well drained Arnot soils; moderately deep, well drained excessively drained Oquaga soils; and exposed bedrock. The Arnot soil is mainly in the somewhat excessivly drained part and the Oquaga soil is in the excessively drained part of the drainage range for their respective series. These very bouldery soils formed in glacial till over sandstone, siltstone, and shale bedrock on hillsides, valleysides, and mountains. The Arnot soil is intermingled with the Rock outcrop throughout the unit, but is mainly on back slopes. The Oquaga soil is near the base of slopes. Slope ranges from 35 to 70 percent. Areas of this unit on mountainsides are irregular in shape and are 25 to 500 acres in size. Areas in other positions are long and narrow in shape and are 15 to 150 acres in size.

This unit is made up of about 40 percent Arnot very bouldery silt loam, 30 percent Oquaga very bouldery silt loam, about 20 percent Rock outcrop, and 10 percent other soils. These soils and the Rock outcrop are in such an intricate pattern that they are not shown separately on the soil map.

Typically, the subsoil of the Arnot soil is directly under the forest litter and humus. The subsoil extends to a depth of 14 inches. It is friable, brown, very bouldery silt loam in the upper 3 inches and friable, brown, very channery silt loam in the lower 11 inches. Dusty red, fractured shale bedrock is at a depth of 14 inches.

Typically, the subsoil of the Oquaga soil in a wooded area is directly under the forest litter and humus. The subsoil extends to a depth of 26 inches. It is very friable strong brown, very bouldery silt loam in the upper 5 inches and friable and very friable, yellowish red, very channery loam in the lower 21 inches. Olive gray sandstone bedrock is at a depth of 26 inches.

Included with this unit in mapping are Valois, Swartswood, Lackawanna, and Bath soils that are intermingled with the Oquaga soils at the base of slopes where soil depth is more than 40 inches. In the Shawangunk Mountains and on the plateau adjacent to the Catskill Mountains, the Oquaga position in this unit is made up of Lordstown soil. Also included are small spots of quarry rubble and small nonbouldery areas.

The Arnot soil can have free water above the bedrock for brief periods in spring and after heavy rain. The root zone consists of 10 to 20 inches of well aerated soil material over bedrock. A few roots penetrate fractures in the bedrock in some areas. Available water capacity is very low, and plants wilt quickly during dry periods.

Free water is occasionally above the bedrock for brief periods in the Oquaga soil after very rainy periods, but it is generally below a depth of 6 feet. The root zone consists of 20 to 40 inches of soil over bedrock. Available water capacity is low to moderate.

Permeability is moderate in both soils. Runoff is very rapid. Boulders are dominantly 2 to 6 feet across and 1 to 2 feet thick, but many are smaller and a few are larger. Distance between boulders varies, but it is generally 5 to 30 feet. Boulders cover 0.1 to 3 percent of the surface of these soils. Reaction is extremely acid to medium acid throughout both soils.

Most areas of this map unit are used for woodland and for wildlife habitat. Very steep slopes, rock outcrops, surface boulders, and moderate and shallow depth to bedrock prevent most uses other than woodland and wildlife habitat. Some areas are scenic spots and have potential for recreational developments.

Woodland productivity is poor on the Arnot soil and moderately high on the Oquaga soil. Logging and establishing new plantations are very difficult. Good design and drainage dips or water bars can be used to help protect logging roads and skid trails from erosion.

Construction for urban and recreational developments is extremely difficult. The hazard of erosion is very high in areas where vegetation is removed. Some of the higher areas have development potential as lookout points. Establishing trails across slope in recreational areas helps protect the soils from erosion. Capability subclass VIIs.

At—Atherton silt loam. This deep, nearly level, poorly drained and very poorly drained soil formed in glacial outwash. It is on flats or in depressions on glacial outwash terraces, stream terraces, and kame-and-kettle topography. It receives a large amount of runoff and seepage from adjacent soils. Slope ranges from 0 to 2 percent. Most areas are long and narrow or oval in shape and are 5 to 80 acres in size.

Typically, the surface layer is very dark gray silt loam 7 inches thick. The subsoil extends to a depth of 27 inches. The upper 6 inches is friable, mottled, gray silt loam; the next 6 inches is firm, mottled, gray, silty clay loam; the next 9 inches is firm, mottled, brown, gravelly loam; and the lower 6 inches is friable, mottled, brown gravelly sandy loam. The substratum to a depth of 65 inches is stratified gray sand, gravel, and very gravelly sandy loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Red Hook and Raynham soils that dry out earlier in spring than this Atherton soil. In a few broader depressions are small areas of Lamson soils that formed in water-sorted sands and Canandaigua soils that formed in lacustrine deposits of silt, very fine sand, and clay. Also included are small areas of soils that have a surface layer of mucky silt loam and gravelly silt loam.

In undrained areas of this soil, water is on or near the surface late in fall, in winter, and early in spring. Roots are mainly confined to the upper 10 to 15 inches of the

soil in these areas, but as the water table recedes, a few roots extend below this depth. Available water capacity of this zone is low, but generally enough water is present for plant growth. Permeability is moderate in the surface layer and subsoil and is moderate or moderately rapid in the substratum. Runoff is very slow. This soil also receives considerable runoff from adjacent soils. In unlimed areas, reaction is strongly acid to neutral in the surface layer and upper part of the subsoil and is medium acid to mildly alkaline in the lower part of the subsoil.

This soil is not intensively used. Wetness is the main limitation. Most of the acreage is wooded, idle, or used for pasture. This soil generally has poor potential for farming.

Undrained areas of this soil are too wet for cultivated crops and are limited mainly to pasture, woodland, and wildlife habitat. If adequately drained, this soil is suitable for crops. Drainage outlets are difficult to locate in many areas. A combination of surface and subsurface drains are needed where drainage is feasible. Diversion terraces are needed in some areas to divert surface runoff from adjacent soils. Keeping the soil from crusting after rains and maintaining tilth and a high level of fertility and organic matter are also very important. Minimum tillage, incorporating crop residue into the soil, crop rotation, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management.

Most areas of this soil are wooded. Woodland productivity is moderate. Machine planting of tree seedlings is not practical, except during the drier part of the growing season.

The seasonal high water table is a severe limitation for community development and recreational uses. In places, this soil is suitable for marshes and ponds, but each site should be investigated to be sure that water will not be lost through porous layers. Capability subclass IVw.

Ba—Barbour loam. This deep, nearly level, well drained soil formed in alluvium derived from reddish sandstone, siltstone, and shale. It is on first bottoms adjacent to streams and is subject to flooding. Slope ranges from 0 to 3 percent. Areas are long and narrow in shape and are 5 to 25 acres in size.

Typically, the surface layer is dark reddish brown loam 6 inches thick. The very friable, reddish brown subsoil extends to a depth of 28 inches. The upper 9 inches is gravelly loam; the next 10 inches is gravelly fine sandy loam; and the lower 3 inches is gravelly sandy loam. The substratum to a depth of 50 inches is dark brown, very gravelly sand.

Included with this soil in mapping are small areas of Basher soils that are wetter than these Barbour soils; small areas of soils in small stream valleys in which the surface layer commonly is gravelly; and small areas of soils in which the surface layer is silt loam and fine sandy loam. Also included are thin, narrow strips of Tunkhannock soils on glacial-stream terraces and Alluvial land bordering the streams.

This soil is subject to occasional flooding. Flooding generally occurs when runoff is heavy in winter and early in spring. Floods are generally of brief duration. Depth of soil available for rooting is related to the height of the water table, which is controlled in many areas by the adjacent streams. Available water capacity is moderate. Droughtiness is a slight hazard in the drier periods during the growing season. Permeability is moderate in the surface layer and subsoil and is rapid in the substratum. In unlimed areas, the surface layer and subsoil are very strongly acid to medium acid.

Broad areas of this soil have good potential for farming. Some areas are so narrow and uneven that cropping is not feasible. Most areas are idle or are used for meadow crops. The more commonly flooded areas are better suited to pasture and trees than to other uses.

Because of the hazard of flooding, this soil is better suited for corn, hay, and pasture than it is for most other crops. In some places gouging by floodwaters and undercutting of streambanks are problems (fig. 3). During flooding, sediment ranging in size from silt to gravel is deposited on the surface. Increasing the content of organic matter and improving tilth are major concerns in management. Minimum tillage, use of cover crops, and including legumes and grasses in the cropping system help to maintain and improve soil structure. Tilling within the proper range of moisture reduces soil compaction.

This soil is well suited to woodland and to wildlife habitat. Woodland productivity is high. Machine planting of tree seedlings is practical on large areas of this soil.

The hazard of flooding severely limits community development. Facilities for such recreational uses as picnicking, golfing, and boating are moderately suited. Recreational buildings need to be anchored when constructed on the flood plain. Capability subclass IIw.

Be—Basher silt loam. This deep, nearly level, moderately well drained and somewhat poorly drained soil formed in alluvium derived mainly from reddish sandstone, siltstone, and shale. It is mainly along streams that have low gradient. This soil is subject to flooding. Slope ranges from 0 to 2 percent. Most areas are long and narrow in shape and are 5 to 40 acres in size.

Typically, the surface layer is dark reddish brown silt loam 9 inches thick. The subsoil extends to a depth of 27 inches and is friable silt loam. It is dark reddish brown in the upper part and brown in the lower part. It has mottles below a depth of 14 inches. The substratum to a depth of 52 inches is mottled, grayish brown and gray loam in the upper part and very dark gray fine sandy loam in the lower part.

Included with this soil in mapping are narrow strips of nearly level Barbour soils that are in slightly higher positions and are drier than this Basher soil; a few areas of

Wayland soils that are in lower positions and are wetter; and some areas of soils that have a surface layer of loam, gravelly silt loam, and gravelly loam. Also included are small areas of Alluvial land and areas of a soil that is similar to this Basher soil but has stratified sand and gravel in the substratum.

This soil is subject to flooding any time during the year, but it occasionally is flooded for brief periods when runoff is heavy in winter and in spring. In many areas, the seasonal high water table is controlled by the water level in the adjacent stream. It is at a depth of 6 to 24 inches in winter, in spring, and in other excessively wet periods. Rooting depth is controlled by the water table; the root zone is mainly in the upper 18 to 24 inches of the soil. Available water capacity of this zone is moderate. Permeability is moderate in the surface layer, is moderate or moderately slow in the subsoil, and is moderate or moderately rapid in the substratum. Runoff is slow or very slow. In unlimed areas, reaction is very strongly acid to medium acid in the surface layer and subsoil.

Most areas of this soil are used for hay, pasture, and woodland. Broad areas have good potential for farming. Some areas are so narrow and uneven that cropping is not feasible. The more commonly flooded areas are better suited to pasture and trees than to other uses.

This soil is suited to row crops, hay, and pasture. Specialty crops can be grown, but flooding may result in crop loss in some years. Flooding and seasonal wetness are the main limitations. Spring planting is delayed because of wetness. Intensively cultivated areas should be artificially drained with surface and subsurface drains for high production. Keeping the soil from crusting after rains and maintaining tilth and a high level of fertility are concerns in management. Minimum tillage, incorporating crop residue into the soil, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

The hazard of flooding and seasonal wetness severely limit community development. This soil has potential for such recreational uses as paths and trails, golfing, and boating. Recreational buildings need to be anchored when constructed on the flood plain. This soil is a good source of topsoil. Capability subclass IIw.

BgC—Bath gravelly silt loam, 8 to 15 percent slopes. This deep, well drained, sloping soil formed in glacial till. It is near the crests of hills or on convex side slopes where water does not accumulate. Most areas are long and narrow in shape and are 5 to 20 acres in size.

Typically, the surface layer is dark brown gravelly silt loam about 6 inches thick. The upper part of the subsoil extends to a depth of about 28 inches. It is friable, yellowish brown gravelly loam. The lower part of the subsoil is a firm, dark yellowish brown gravelly loam fragipan that extends to a depth of 55 inches. The substratum to a depth of 65 inches is firm, dark yellowish brown gravelly loam.

Included with this soil in mapping are small areas of moderately well drained Mardin soils in which the fragipan is at a shallower depth than in this Bath soil; small areas of somewhat poorly drained Volusia soils that are on foot slopes and in some drainageways; and narrow strips of Lordstown and Manlius soils that have bedrock at a depth of 20 to 40 inches.

This soil generally has free water above the fragipan for brief periods late in fall, in winter, and early in spring. Because the fragipan is so dense, roots cannot easily penetrate it. Roots are mainly confined to the 26- to 38-inch zone above the slowly permeable fragipan. Available water capacity is moderate. Permeability is moderate in the surface layer and in the upper part of the subsoil. Runoff is rapid. In unlimed areas, reaction is very strongly acid to medium acid in the surface layer and subsoil.

This soil has fair potential for farming. Most of the acreage is used for fruit crops, hay, and pasture. This soil has good potential for orchards. Slope, slight wetness, and slow permeability in the fragipan are limitations for community developments.

This soil is suited to crops, pasture, or forest. Use of this soil in farming is somewhat limited because of slope. Gravel and small stones hinder tillage in some areas. Erosion is a major concern, especially if slopes are long. Sod-forming crops are needed in the cropping system a large percentage of the time. Standard management practices, for example, minimum tillage, use of cover crops, good fertilization, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation, help to improve tilth and maintain the content of organic matter.

This soil is suited to orchards maintained in permanent sod cover. It is only moderately suited to vineyards, because vineyards are cultivated and erosion is a hazard. Soil compaction is a continuous hazard because spraying operations are commonly done during wet periods. Using lighter machinery with wider tire treads or using specially designed machinery when spraying helps to prevent soil compaction.

Woodland productivity is moderately high. Only a small acreage of this soil is wooded. Machine planting of tree seedlings is practical on large areas of this soil.

Effluent from some septic tank absorption fields seeps to the surface in this soil. Absorption fields should be much larger than those commonly used because of the slow permeability in the fragipan. In areas where public sewers are available, this soil has few limitations for residential housing. Erosion is a hazard during construction. A vegetative cover maintained on the site during construction helps prevent erosion. Capability subclass IIIe.

BgD—Bath gravelly silt loam, 15 to 25 percent slopes. This deep, moderately steep, well drained soil formed in glacial till. It is mainly on convex hillsides and valley sides. Most areas are dissected by narrow drainageways. Runoff generally is received from higher adjacent soils. Areas are mainly long and narrow in shape and are 5 to 30 acres in size.

Typically, the surface layer is dark brown gravelly silt loam about 6 inches thick. The upper part of the subsoil extends to a depth of about 28 inches. It is friable, yellowish brown gravelly loam. The lower part of the subsoil is a firm, dark yellowish brown gravelly loam fragipan that extends to a depth of about 55 inches. The substratum to a depth of about 65 inches is firm, dark yellowish brown gravelly loam.

Included with this soil in mapping are narrow strips of Lordstown and Manlius soils that have bedrock at a depth of 20 to 40 inches and areas of moderately well drained Mardin soil that have a shallower depth to the fragipan than this Bath soil. Also included in some areas are small spots of eroded soils.

Free water is generally above the fragipan for brief periods late in fall, in winter, and early in spring. Because the fragipan is so dense, roots cannot easily penetrate it. Roots are mainly confined to the 26- to 38-inch zone above the slowly permeable fragipan. Available water capacity is moderate. Permeability is moderate in the surface layer and in the upper part of the subsoil. Runoff is very rapid. In unlimed areas, reaction is very strongly acid to medium acid in the surface layer and subsoil.

Because of slope, this soil has poor potential for farming. Most of the acreage is used for permanent pasture, orchards, and woodland. It has good potential for woodland and for wildlife habitat.

This soil is poorly suited to cultivated crops. It can be cropped successfully, but cropping systems need to include a high proportion of long term hay or pasture. Using tillage equipment is very difficult, especially using large machines. The hazard of erosion is severe. Contour farming, minimum tillage, and good fertilization are important in management.

Orchards that are maintained in permanent sod cover are suited to this soil, provided driving lanes are constructed in some areas to avoid the hazard of machinery upset. Because vineyards are cultivated, they are poorly suited to this soil.

Woodland productivity is moderately high. The slope presents some difficulty in machine planting of tree seedlings.

This soil is limited for most urban uses because of the slope and slow permeability in the fragipan. The hazard of erosion is severe during construction. Septic tank absorption fields are difficult to lay out and construct. Controlling the downhill flow of effluent is a major concern. Capability subclass IVe.

BHE—Bath very stony soils, steep. These deep, well drained soils formed in glacial till. They are on convex hillsides and valley walls. Slope ranges from 25 to 35 percent. Most areas are long and narrow in shape and are 5 to 60 acres in size.

Typically, the surface layer is brown, very stony silt loam about 4 inches thick. The upper part of the subsoil extends to a depth of about 26 inches. It is friable, yellowish brown gravelly loam. The lower part of the subsoil is a firm, dark yellowish brown gravelly loam fragipan that extends to a depth of about 50 inches. The substratum to a depth of about 60 inches is firm, dark yellowish brown gravelly loam.

Included with these soils in mapping are narrow strips of Manlius and Nassau soils that are on the upper part of slopes and have bedrock within a depth of 40 inches. Many areas of included soils have slopes of 35 to 55 percent. Also included are small areas of Hoosic and Valois soils on the lower part of some slopes and a few nonstony areas and small areas of eroded soils.

Free water is generally above the fragipan for brief periods late in fall, in winter, and early in spring. Because the fragipan is so dense, roots cannot easily penetrate it. Roots are mainly confined to the zone above the slowly permeable fragipan. Available water capacity is moderate. Permeability is moderate in the surface layer and in the upper part of the subsoil. Runoff is very rapid. Surface stones are subrounded or angular and are 10 inches to about 4 feet across. They are spaced 5 to 30 feet apart. In unlimed areas, reaction is very strongly acid to medium acid in the surface layer and subsoil.

Slope dominates the capabilities of these soils. Most areas are used for woodland and for wildlife habitat. These soils have poor potential for farming and for urban developments. Some areas are scenic spots and have potential for recreational development.

Because of the steep slopes and surface stoniness, these soils are very poorly suited to crops and pasture.

Woodland productivity is moderately high. Slope and surface stones present severe equipment limitations.

Steep slopes cause difficulty in construction for urban development and in the installation of septic sewage systems. The hazard of erosion is high when vegetation is removed. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. Capability subclass VIIs.

BnC—Bath-Nassau complex, 8 to 25 percent slopes. This map unit consists of a deep, well drained Bath soil and a shallow, somewhat excessively drained Nassau soil. These sloping to moderately steep soils formed in glacial till. Areas are mainly on a series of ridges that are cored by folded, shale, slate, siltstone, and sandstone bedrock. The ridges are generally oriented in a northeast-southwest direction. Relief is very irregular. The Bath soil is in the convex inter-ridge areas where runoff does not accumulate and the Nassau soil is

on the sides and tops of the bedrock ridges. Areas are 10 to more than 500 acres in size. They vary in shape.

This unit is made up of 50 percent Bath gravelly silt loam, 30 percent Nassau shaly silt loam, and 20 percent other soils. Bath and Nassau soils are in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Bath soil is dark brown gravelly silt loam about 6 inches thick. The upper part of the subsoil extends to a depth of about 28 inches. It is friable, yellowish brown gravelly loam. The lower part of the subsoil extends to a depth of 48 inches. It is a firm, dark yellowish brown gravelly loam fragipan. Dark gray shale bedrock is at a depth of about 48 inches.

Typically, the surface layer of the Nassau soil is brown shaly silt loam 6 inches thick. The upper part of the subsoil extends to a depth of 10 inches. It is very friable, yellowish brown very shaly silt loam. The lower part of the subsoil extends to a depth of 16 inches. It is friable, brown very shaly silt loam. Dark gray shale bedrock is at a depth of about 16 inches.

Included with these soils in mapping are small areas of well drained and excessively drained Manlius soils that are underlain with folded bedrock at a depth of 20 to 40 inches. They are intermingled with the major soils on the ridges and between the ridges. The somewhat poorly drained Volusia soils are in a few small depressions between the ridges. A few rock outcrop and wet spots are included, and most of these are shown on the soil map by special symbols. A strip about 3 miles wide in the Shawangunk Kill and Wallkill Valleys has the moderately well drained Cambridge soil in the Bath position. Also included are very small areas of lake-deposited Hudson, Cayuga, Schoharie, Raynham, Churchville, and Rhinebeck soils that are intermingled with the Bath soil between the ridges.

The Bath soil generally has free water above the fragipan for brief periods late in fall, in winter, and early in spring. Roots are confined mainly to the 26- to 38-inch zone above the slowly permeable fragipan. Available water capacity is moderate. Depth to bedrock is more than 40 inches. Permeability is moderate in the surface layer and in the upper part of the subsoil.

Roots in the Nassau soil are confined mainly to the 10 to 20 inches of soil above the bedrock. A few roots penetrate fractures in bedrock in some areas. Because of shallowness to bedrock, available water capacity is very low, and plants wilt quickly during dry periods. Permeability is moderate in the Nassau soil.

Runoff is rapid from both soils. In unlimed areas, the Bath soil is very strongly acid to medium acid in the surface layer and subsoil. The Nassau soil is very strongly acid or strongly acid in the surface layer and subsoil.

This unit is used mainly for orchards, permanent pasture, and woodland. Potential is good for these uses. This unit is poor for cultivated crops. Some areas of this unit are used for vineyards and hay. The variable depth to bedrock; irregular relief; and the dense, slowly permeable fragipan in the Bath soil limit intensive use of these soils.

These soils can be cropped, but the cropping system needs to include a high proportion of sod-forming crops and pasture. Available water capacity varies within short distances. Erosion is a severe hazard. Conservation practices, other than sod-forming crops and minimum tillage, are very difficult to install because of the uneven topography.

Orchards maintained in permanent sod cover are suited to these soils. Driving lanes are needed in some areas to avoid the hazard of machinery upset. Because vineyards are clean cultivated, they are poorly suited to these soils because of the hazard of erosion.

Woodland productivity is moderately high on the Bath soils and poor on the Nassau soils. Machine planting of tree seedlings is practical in large areas of these soils.

The variable depth to bedrock, irregular relief, and the dense, slowly permeable fragipan in the Bath soil are severe limitations for most urban uses. Some esthetic homesite areas are in this unit but sites for sewage disposal can be very limiting. Most areas have potential for dwellings without basements if public sewers are available. Erosion is a hazard during construction. A vegetative cover maintained on the site helps prevent erosion. Capability subclass IVe.

BOD—Bath-Nassau-Rock outcrop complex, hilly. This map unit consists of a deep, well drained Bath soil; a shallow, somewhat excessively drained Nassau soil; and small areas of exposed bedrock. The soils formed in glacial till. Areas are mainly on a series of ridges that are cored by folded shale, slate, siltstone, and sandstone bedrock. The ridges are generally oriented in a northeast-southwest direction. The Bath soil mainly is in convex inter-ridge areas where runoff does not accumulate. The Nassau soil is on ridgesides and is intermingled with rock outcrops on ridgetops. Relief is very irregular. Slopes are short and generally complex. They are mainly 10 to 25 percent, but range from 10 to 30 percent. Areas vary in size and shape. Some areas are as much as 1,000 acres in size.

This unit is made up of about 40 percent Bath gravelly silt loam, about 25 percent Nassau shaly silt loam, about 15 percent Rock outcrop, and 20 percent other soils. These soils and Rock outcrop are in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of Bath soil is dark brown gravelly silt loam about 6 inches thick. The upper part of the subsoil extends to a depth of about 28 inches. It is friable, yellowish brown gravelly loam. The lower part of the subsoil extends to a depth of about 48 inches. It is a firm, dark yellowish brown gravelly loam fragipan. Dark gray shale bedrock is at a depth of 48 inches.

Typically, the surface layer of the Nassau soil is brown shaly silt loam about 6 inches thick. The upper part of the subsoil extends to a depth of 10 inches. It is very friable, yellowish brown, very shaly silt loam. The lower part of the subsoil extends to a depth of 16 inches. It is friable, brown, very shaly silt loam. Dark gray shale bedrock is at a depth of about 16 inches.

Included with this unit in mapping are somewhat poorly drained Volusia soils and moderately well drained Mardin soils that are intermingled with the Bath soils on foot slopes and in depressions in areas between ridges; well drained to excessively drained Manlius soils that have bedrock at a depth of 20 to 40 inches and are intermingled with the major soils on ridges and between ridges; and lake-deposited Hudson, Cayuga, and Schoharie soils that are intermingled with the Bath soil between ridges. Also included are some very stony areas; areas that have slopes of 3 to 10 percent; and a strip about 3 miles wide in the Wallkill and Shawangunk Kill Valleys in which moderately well drained Cambridge soils are in the Bath position.

The Bath soil generally has free water above the fragipan for short periods late in fall, in winter, and early in spring. Roots are confined mainly to the 26- to 38-inch zone above the slowly permeable fragipan. Available water capacity is moderate. Depth to bedrock is more than 40 inches. Permeability is moderate in the surface layer and in the upper part of the subsoil.

In the Nassau soil, roots are confined mainly to the 10 to 20 inches of soil above the bedrock. A few roots penetrate fractures in some areas. Because of the shallowness to bedrock, available water capacity is very low, and plants wilt early during dry periods. Permeability is moderate in the Nassau soil.

Runoff is medium to very rapid. In unlimed areas, the Bath soil is very strongly acid to medium acid in the surface layer and subsoil. The Nassau soil is strongly acid or very strongly acid in the surface layer and subsoil.

This unit is used mainly for woodland and for wildlife habitat to which it is well suited. Some areas are in permanent pasture and orchards. The unit has poor potential for farming. It has potential for some types of recreational developments.

Farm uses are affected by the variable depth to bedrock, slope, rock outcrops, and the dense, slowly permeable fragipan in the deeper soils of this unit. The rock outcrops hinder fertilizing and mowing of pasture.

Fruit trees are generally widely spaced, and orchards have open spaces in areas of rock outcrops and where the soils are quite shallow. Vineyards are poorly suited to these soils because of the hazard of erosion, variable depth to bedrock, and rock outcrops.

Woodland productivity is moderately high on the Bath soil and is poor on the Nassau soil. The rock outcrops interfere with machine planting of tree seedling.

The variable depth to bedrock, the slope, rock outcrops, and the dense, slowly permeable fragipan in the Bath soil are severe limitations for most urban uses. Some esthetic homesites are in areas of this unit, but sites for sewage disposal can be very limiting. Most areas have potential for dwellings without basements if public sewers are available. Slope and rock outcrops are minor limitations to uses such as paths and trails. A vegetative cover maintained on the site during construction helps prevent erosion. Capability subclass VIs.

BRC—Bath and Mardin very stony soils, sloping. This map unit consists of well drained Bath soils and moderately well drained Mardin soils that are mainly on convex hilltops and hillsides and on foot slopes. These deep, very stony soils formed in glacial till. Slope ranges from 8 to 15 percent. Areas are oblong or irregular in shape and are 10 to 300 acres in size.

Many areas of this unit are made up of both soils, but some areas consist only of the Bath soils and others of only the Mardin soils. Surface stoniness dominates the capabilities of the unit so much that the difference between the Bath and Mardin soils is relatively unimportant.

Typically, the surface layer of the Bath soil is dark grayish brown, very stony silt loam about 5 inches thick. The upper part of the subsoil extends to a depth of 28 inches. It is friable, yellowish brown gravelly loam. The lower part of the subsoil extends to a depth of about 55 inches. It is a firm, dark yellowish brown gravelly loam fragipan. The substratum to a depth of about 65 inches is firm, dark yellowish brown gravelly loam.

Typically, the surface layer of the Mardin soil is very dark grayish brown, very stony silt loam about 6 inches thick. The upper part of the subsoil extends to a depth of about 17 inches. It is friable, yellowish brown gravelly silt loam and has mottles below a depth of 14 inches. A thin leached layer of firm, mottled, pale brown gravelly loam 4 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil extends to a depth of about 46 inches. It is a firm fragipan that is mottled, olive brown gravelly light loam. The substratum to a depth of 56 inches is firm, mottled, yellowish brown gravelly loam.

Included with these soils in mapping are areas of somewhat poorly drained Volusia and Churchville soils that are on foot slopes and in depressions and make up about 10 percent of some areas; moderately well drained Cambridge soils that are in the Wallkill and Shawangunk Kill Valleys; and narrow strips of Manlius and Lordstown soils that have bedrock at a depth of 20 to 40 inches. Also included are a few small areas of nonstony soils that were cleared for crops and some areas of soils that have slopes of 3 to 8 percent and 15 to 25 percent.

Bath and Mardin soils have a temporary seasonal high water table that is perched above the slowly permeable fragipan and substratum. The water table is at a depth of about 24 to 48 inches in the Bath soils and is slightly

closer to the surface in the Mardin soils. Roots are confined mainly to the moderately permeable zone above the fragipan. This zone ranges from 26 to 38 inches in the Bath soils, in which available water capacity is moderate. The Mardin soils have a 14- to 26-inch root zone in which available water capacity is low to moderate. Runoff is medium to very rapid. Stones are subrounded or angular and are 10 inches to almost 4 feet across. They are spaced about 5 to 30 feet apart on the surface.

In unlimed areas, reaction in the Bath soils is very strongly acid to medium acid in the surface layer and subsoil. Reaction in the Mardin soils is very strongly acid to medium acid above the fragipan and is very strongly acid to slightly acid in the fragipan.

Most areas of these soils are used for woodland and for wildlife habitat to which they are well suited. They have poor potential for farming. Removal of stones greatly increases the potential for farming.

Some areas of these soils are used for hay and permanent pasture, but the stones hinder fertilizing and mowing. The stones on the surface need to be removed before the soils can be cultivated. If stones are removed, these soils can be farmed. Using tillage equipment on included, moderately steep areas in this map unit is difficut. Erosion is a severe hazard. Contour farming, cover crops, and minimum tillage are needed to help control erosion and to conserve moisture and promote good tilth.

After stones are removed, some areas of these soils are suited to orchards and vineyards.

Woodland productivity is moderately high. Surface stones cause some difficulty in machine planting of tree seedlings.

Urban and recreational development is limited by the slow permeability in the fragipan, surface stones, slope, and slight seasonal wetness. Controlling the downhill flow of effluent is a problem in many areas. Providing public sewers helps to increase the suitability of these soils for residential housing. The hazard of erosion is severe during construction in some areas. Capability subclass VIs.

CaB—Cambridge gravelly silt loam, 3 to 8 percent slopes. This deep, gently sloping, moderately well drained soil formed in glacial till on till plains. It is on hilltops and foot slopes. Slopes are slightly convex or smooth. Most areas are long and narrow in shape and are 10 to 100 acres in size.

Typically, the surface layer is brown gravelly silt loam about 9 inches thick. The subsoil extends to a depth of about 60 inches. The upper 8 inches of the subsoil is friable, yellowish brown gravelly loam; the next 4 inches is firm, mottled, dark yellowish brown gravelly clay loam; and the lower 48 inches is a firm and brittle, brown, gravelly clay loam fragipan. The substratum to a depth of 80 inches is brown gravelly loam.

Included with this soil in mapping are narrow strips of Churchville and Volusia soils that are wetter than these Cambridge soils, are in depressions, and make up 10 percent of some individual areas. Also included are narrow strips of Manlius soils that are on hilltops and have bedrock at a depth of 20 to 40 inches; some areas of Cayuga soils that are on the lower part of slopes; and small areas of Mardin soils that are on the upper part of long slopes.

A seasonal high water table is perched at a depth of 1 to 3 feet above the dense fragipan in winter, in spring, and in other excessively wet periods. Water tends to move laterally above the fragipan. Roots are confined mainly to the 16 to 26 inches of soil above the fragipan. Available water capacity of this zone is low to moderate. Conserving water during midsummer is important. Permeability is moderate above the fragipan, is slow or very slow in the fragipan, and is slow or moderately slow in the substratum. Runoff is medium. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and upper part of the subsoil above the fragipan and is slightly acid or neutral in the fragipan.

Most of the acreage of this soil is used for cultivated crops, hay, pasture, or woodland. Some areas are used for fruit crops. The soil has good potential for farming, but it has limited potential for community development because of the seasonal wetness, slow or very slow permeability in the fragipan, and gravel and small stones on the surface layer.

This soil is suited to crops, hay, and pasture. In most places, seasonal wetness delays planting for brief periods. Random subsurface drains are needed in the wetter included soils so crops can be planted early in spring. Drainage of areas on foot slopes can be improved by diverting surface water that would generally flow over this soil from higher adjacent areas. Diversions and such practices as contour farming, cover crops, and minimum tillage help to control erosion. Good fertilization, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation, help to improve tilth, maintain the content of organic matter, and control erosion. Gravel and small stones cause some difficulty in tillage.

Fruit crops are suited to this soil. Soil compaction is a continuous hazard, because spraying operations with use of heavy equipment are commonly performed during wet periods. Artificial drainage, maintaining good sod cover, and use of lighter machinery that has wider tire treads or use of specially designed machinery help prevent soil compaction.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

The seasonal high water table and slow or very slow permeability in the fragipan are limitations for many urban uses. This soil is better suited to dwellings without basements than to those with basements. Foundation drains and protective coatings on the exterior walls of

basements are needed. Effluent from many septic tank absorption fields seeps to the surface in this soil. Absorption fields need to be much larger than those commonly used because of the slow or very slow permeability in the fragipan. This soil has potential for recreational uses even though wetness, slow or very slow permeability, gravel, and small stones interfere with many of these uses. Capability subclass IIe.

CaC—Cambridge gravelly silt loam, 8 to 15 percent slopes. This deep, moderately well drained, sloping soil formed in glacial till on dissected till plains. It generally receives runoff from associated soils. Slopes are slightly convex. Most areas are long and narrow in shape and are 5 to 50 acres in size.

Typically, the surface layer is brown gravelly silt loam 6 inches thick. The subsoil extends to a depth of 58 inches. The upper 14 inches is friable, yellowish brown gravelly loam; the next 3 inches is firm, mottled, dark yellowish brown gravelly clay loam; and the lower 41 inches is a firm and slightly brittle, brown gravelly clay loam fragipan. Dark gray shale bedrock is at a depth of about 64 inches.

Included with this soil in mapping are small areas of Churchville and Volusia soils that are on foot slopes, in drainageways, and on hillside seeps and that remain wet later in spring; some areas of Mardin soils that are intermingled with this Cambridge soil but not extensively; and narrow strips of Manlius soils that have bedrock at a depth of 20 to 40 inches. Also included are areas of Bath soils on the upper part of some slopes and Cayuga soils on the lower part.

A seasonal high water table at a depth of 1 to 3 feet is perched above the dense fragipan in winter, in spring, and in other excessively wet periods. Water tends to move laterally above the fragipan. Roots are confined mainly to the 16 to 26 inches of soil above the fragipan. Available water capacity of this zone is low to moderate. Conserving water during midsummer is important. Permeability is moderate above the fragipan, is slow or very slow in the fragipan, and is slow or moderately slow in the substratum. Runoff is rapid. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and upper part of the subsoil above the fragipan and is slightly acid or neutral in the fragipan.

Most of the acreage of this soil is used for hay, pasture, and woodland. Some areas are used for cultivated crops and fruit crops. This soil has fair potential for farming. Slope, seasonal wetness, and slow or very slow permeability in the fragipan are limitations for community developments.

This soil is suited to crops, hay, and pasture. Use of this soil is somewhat limited because slope causes some difficulty in farming operations. If the soil is intensively used for intertilled crops, erosion is a major hazard. If proper management and conservation measures are practiced, crops can be grown. Sod-forming crops can be grown a large proportion of the time. Contour farming is practical and needs to be used in many areas. Minimum tillage, use of cover crops, good fertilization, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation help to improve tilth, maintain the content of organic matter, and reduce the hazard of erosion. Gravel and small stones hinder tillage in some areas. Seasonal wetness delays planting for brief periods.

This soil is suited to orchards that are maintained in permanent sod cover, but it is only moderately suited to vineyards. Because vineyards are cultivated, erosion is a hazard. Soil compaction is a continuous problem because spraying operations are commonly performed during wet periods. Using lighter machinery and wider tire treads or specially designed machinery helps prevent soil compaction.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

Effluent from septic tank absorption fields seeps to the surface in this soil. Absorption fields should be much larger than those commonly installed because of the slow or very slow permeability in the fragipan. In areas where public sewers are available, this soil is only moderately limited for residential housing. Foundation drains and protective coatings on the exterior walls of basements are needed. Erosion is a hazard during construction for urban developments. A vegetative cover maintained on the site during construction helps prevent erosion. This soil has potential for some recreational uses even though slope, slow or very slow permeability, wetness, gravel, and small stones limit most uses. Capability subclass IIIe.

Cc—Canandaigua silt loam. This deep, nearly level, poorly drained and very poorly drained soil formed in lacustrine deposits of silt, very fine sand, and clay. It is in low depressions on stream terraces and lake plains and in upland basins formerly occupied by glacial lakes. This soil receives runoff from surrounding areas. Slope is mainly less than 1 percent. Most areas are oblong or irregular in shape and are 10 to 50 acres in size.

Typically, the surface layer is very dark gray silt loam 9 inches thick. The upper part of the subsoil extends to a depth of about 18 inches. It is firm, mottled, gray silty clay loam. The lower part of the subsoil extends to a depth of about 37 inches. It is friable, mottled, gray silt loam. The substratum to a depth of about 60 inches is mottled, yellowish brown silt loam.

Included with this soil in mapping are small areas of Raynham soils that are better drained than this Canandaigua soil; some areas of soils that have a loamy substratum at a depth of 40 to 60 inches; and a few small areas of soils that have a surface layer of muck or mucky silt loam. Also included are some wooded areas of this soil that are on the plateau adjacent to the Catskill Mountains and are strongly acid or very strongly acid

in the surface layer. Also included are small areas of the more sandy Lamson soils and the finer textured Madalin soils, both of which have drainage similar to that of this soil.

This soil mainly is on lake plains and in upland basins that are not subject to flooding. Some areas on low stream terraces are subject to flooding during abnormal conditions. Unless this soil is artificially drained, it has water at the surface late in fall, in winter, in spring, and after each rainy period. The depth of soil available for rooting is mainly 10 to 20 inches and is related to the height of the water table. As the water table recedes, roots extend to a greater depth. Available water capacity in the root zone is moderate to low. Water deficiency generally is not a hazard. Permeability is moderate in the surface layer and is moderately slow in the subsoil and substratum. Runoff is very slow. Reaction is medium acid to mildly alkaline in the surface layer and is slightly acid to mildly alkaline in the subsoil.

This soil is not used intensively. Most of the acreage of this soil is wooded, idle, or is used for pasture. This soil has fair to poor potential for farming and good potential for wetland wildlife.

Unless drained, this soil is too wet for cultivated crops. If adequately drained, it is well suited to crops. Wetness is the main concern of management. A combination of surface and subsurface drains are needed in many areas. Drainage outlets are difficult to establish in some areas because of the basinlike topography. Diversion terraces are needed in some areas to divert surface runoff from this soil. Keeping the soil from crusting after rains, and maintaining tilth and a high level of fertility, and organic matter are also very important. Minimum tillage, incorporating crop residue into the soil, crop rotation, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management.

Woodland productivity is moderate. Machine planting of tree seedlings is not practical except during the drier part of the growing season. Species that are tolerant of wetness need to be selected for reforestation.

Prolonged wetness and the hazard of flooding in areas on low stream terraces are limitations for community development and recreational uses. Even with artificial drainage and protective coatings on the exterior walls of basements, wet basements are common. Sloughing because of an unstable substratum is a hazard in excavations in this soil. In many areas, this soil is a suitable site for dugout ponds. Embankments are unstable. Capability subclass IVw.

Cd—Canandaigua silt loam, till substratum. This deep, nearly level, poorly drained and very poorly drained soil formed in lacustrine deposits of silt, very fine sand, and clay over glacial till. It is in upland basins formerly occupied by glacial lakes. This soil receives runoff from the surrounding better drained soils. Slope is mainly less than 1 percent. Individual areas are oblong or long and narrow in shape and are 5 to 80 acres in size.

Typically, the surface layer is black silt loam about 9 inches thick. The subsoil is friable, mottled, gray silt loam that extends to a depth of about 37 inches. The substratum is mottled, yellowish brown silt loam to a depth of about 40 inches and mottled, yellowish brown gravelly silt loam to a depth of about 60 inches.

Included with this soil in mapping are small areas of Raynham soils that are better drained than the Canandaigua soil; areas of Canandaigua soils that formed in deeper lacustrine deposits; a few small areas of soils that have a surface layer of muck or mucky silt loam. Also included are narrow strips of Lyons and Volusia soils included in many areas and small areas of Atherton, Lamson, and Palms soils.

Unless this soil is drained artificially, it has water at or near the surface late in fall, in winter, in spring, and after each rainy period. It is often ponded. The depth of soil available for rooting is mainly between 10 and 20 inches and is related to the height of the water table. As the water table recedes, roots extend to a greater depth. Available water capacity in the root zone is moderate to low. Water deficiency generally is not a concern. Permeability is moderate in the surface layer and is moderately slow in the subsoil and substratum. Surface runoff is very slow. Reaction is medium acid to mildly alkaline in the surface layer and is slightly acid to mildly alkaline in the subsoil.

This soil is not used intensively. Most of the acreage is wooded, idle, or used for pasture. This soil has fair to poor potential for farming and good potential for wetland wildlife.

Unless this soil is drained, it is too wet for cultivated crops. If adequately drained, it is well suited to crops. Wetness is the main concern in management. A combination of surface and subsurface drains should be used in many areas. Drainage outlets are difficult to establish in some areas because of the basinlike topography. Diversion terraces are needed in some areas to divert surface runoff from this soil. Keeping the soil from crusting after rain and maintaining tilth and a high level of fertility and organic matter are also very important. Minimum tillage, incorporating crop residue into the soil, crop rotation, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management.

Woodland productivity is moderate. Machine planting of tree seedlings is not practical, except during the drier part of the growing season. Species that are tolerant of wetness need to be selected for reforestation.

Prolonged wetness is a serious limitation for community development and recreational uses. Even with artificial drainage and protective coatings on the exterior walls of basements, wet basements are common. The substratum has higher strength than the topsoil and subsoil. In

many areas, this soil is a suitable site for ponds. Capability subclass IVw.

Ce—Carlisle muck. This deep, nearly level to depressional, very poorly drained soil formed in organic deposits more than 51 inches thick. It is in basins or depressions in swamps and marshes on glaciated uplands and outwash plains. Slope is generally less than 2 percent. Most areas are broad in shape and are 50 to 200 acres in size.

Typically, the surface layer is black muck about 12 inches thick. Very dark grayish brown, nonsticky, slightly plastic muck extends to a depth of about 61 inches.

Included with this soil in mapping are narrow strips of Palms, Canandaigua, Atherton, Lyons, and Menlo soils around the periphery of basins. Palms soils make up nearly 15 percent of some areas. Also included are small areas of Fresh water marsh.

This soil has a seasonal water table and is ponded for long periods in undrained areas late in fall, in winter, and in spring. During dry summers, this soil dries to a depth of 10 to 12 inches, but even in extremely dry summers the water table is within 30 inches of the surface in undrained areas. The root zone is related to the height of the water table and is mainly the upper 10 to 12 inches of soil. Available water capacity of this zone is moderate. Even though internal drainage is very slow because of the low-lying position and the material beneath the organic material, permeability is rapid in the organic deposits. Runoff is very slow. In unlimed areas, reaction is medium acid to neutral throughout the soil.

Most of the acreage of this soil is undrained and is used for growing trees or reeds and sedges. Undrained areas have good potential for wetland wildlife habitat. This soil has fair to poor potential for farming and very poor potential for community developments.

This soil must be drained if it is used for farming. Drained areas can be used intensively for field crops and vegetable crops. Most areas are extremely difficult to drain because of their position in the landscape. In some places, blasting of bedrock is required in the drainage outlet. Pumping over a dike is commonly needed to maintain an outlet. Drainage, mainly by open ditches, makes most areas tillable. Subsurface drains can be used if the ditches are widely spaced. Subsidence or shrinkage occurs after draining. Controlled drainage, whereby the water table can be raised or lowered, reduces shrinkage. Windbreaks should be used to reduce soil blowing in broad, drained areas. Irrigation is needed to control soil blowing and to provide water during extended dry periods. Use of cover crops, good fertilization, minimum tillage, and tilling and harvesting at the proper moisture condition are important in management.

Woodland productivity is moderate. Species that are tolerant of wetness need to be selected for reforestation. Machine planting of tree seedlings generally is not practical in undrained areas.

This soil generally is not used for community and recreational developments because of prolonged wetness, low strength, frost damage, and poor trafficability (fig. 4). Mosquitoes generally present problems when this soil and surrounding soils are used in developments. Sloughing is a severe hazard in excavations in this soil. This soil is a potential commercial source of organic material. In some areas, this soil is a suitable site for dugout ponds or wildlife marshes. Capability subclass IVw.

CgA—Castile gravelly silt loam, 0 to 3 percent slopes. This deep, nearly level, moderately well drained soil formed in glacial outwash. It is in slight depressions on glacial outwash plains, valley trains, and in water-sorted deposits on moraines. Most areas are long and narrow in shape and are 5 to 20 acres in size.

Typically, the surface layer is dark grayish brown gravelly silt loam about 8 inches thick. The subsoil extends to a depth of about 28 inches. The upper 11 inches is friable, yellowish brown and dark yellowish brown gravelly loam and has faint mottles in the lower 5 inches; the next 5 inches is friable, mottled, yellowish brown, very gravelly loam; and the lower 4 inches is very friable, mottled, dark grayish brown, very gravelly sandy loam. The substratum to a depth of about 50 inches is very dark grayish brown, stratified, very gravelly sand.

Included with this soil in mapping are narrow strips of Red Hook and Raynham soils that are wetter than this Castile soil and are in slightly lower positions; small areas of Chenango, Tunkhannock, and Hoosic soils that are on slight rises; some small areas of soils that have a surface layer of gravelly loam; and a few unlimed areas of soils that are medium acid or slightly acid in the surface layer and upper part of the subsoil. Also included are areas of a soil that is similar to the Castile soil but has medium textured and moderately coarse textured layers in the substratum below a depth of 3 1/2 feet.

This soil has a seasonal high water table at a depth of 18 to 24 inches in spring and in excessively wet periods. Roots are influenced by the water table and are mainly confined to the upper 18 to 24 inches of the soil in spring. A few roots penetrate to a greater depth as the water table recedes. Available water capacity is low. Because of excellent water penetration in the root zone, moisture that is supplied to crops is effectively increased by rain during the growing season, rather than being lost through runoff and evaporation. Permeability is moderate or moderately rapid in the surface layer and subsoil and is rapid in the substratum. Runoff is slow. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and subsoil.

Most of the acreage of this soil is used for cultivated crops, fruit crops, hay, or pasture. This soil has good potential for farming, but it is not well suited to many community development uses.

This soil can be used quite intensively for a wide variety of crops. Because of the seasonal high water

table, this soil is not ready for cultivation as early as the higher and drier associated Hoosic, Chenango, and Tunkhannock soils. Artificial drainage generally is not needed, except in areas of included wetter soils. Gravel and small stones hinder tillage in some areas. Good fertilization, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation are important in management. Applied lime and fertilizer are leached from this soil at a moderately rapid rate; consequently, response is generally better to smaller but more frequent or timely applications than to one large application.

Fruit crops are suited to this soil. Soil compaction is a continuous hazard because spraying operations with heavy equipment are commonly performed during wet periods. Artificial drainage, maintaining good sod cover, and use of lighter machinery that has wider tire treads or use of specially designed machinery help prevent soil compaction.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

Because of the seasonal high water, this soil has limitations for many urban uses. This soil is better suited to dwellings without basements than to those with basements. In areas where this soil is used for septic tank absorption fields, rapid permeability in the substratum can cause contamination of ground water. Sloughing is a hazard in excavations in this soil. This soil has potential for recreational uses even though wetness, gravel, and small stones interfere with many of these uses. This soil is a fair source of sand and gravel. Capability subclass IIw.

CgB—Castile gravelly silt loam, 3 to 8 percent slopes. This deep, gently sloping, moderately well drained soil formed in glacial outwash. It is mainly on concave foot slopes on glacial outwash plains, valley trains, and in water-sorted deposits on moraines. Many areas of this soil receive runoff and seepage from higher adjacent soils. Areas vary in shape and are 5 to 40 acres in size.

Typically, the surface layer is dark grayish brown gravelly silt loam about 8 inches thick. The subsoil extends to a depth of about 28 inches. The upper 11 inches is friable, yellowish brown and dark yellowish brown gravelly loam and has faint mottles in the lower 5 inches; the next 5 inches is friable, mottled, yellowish brown, very gravelly loam; and the lower 4 inches is very friable, mottled, dark grayish brown, very gravelly sandy loam. The substratum to a depth of about 50 inches is very dark grayish brown, stratified, very gravelly sand.

Included with this soil in mapping are areas of Chenango, Hoosic, and Tunkhannock soils that are better drained than this Castile soil and are in higher positions; some areas of Red Hook and Raynham soils that are wetter and are in slightly lower positions; and a few small areas of soils that have a surface layer of gravelly loam or gravelly sandy loam. Also included are areas of a soil that is similar to the Castile soil but has medium textured and moderately coarse textured layers in the substratum below a depth of 3 1/2 feet.

This soil has a seasonal high water table at a depth of 18 to 24 inches in spring and in excessively wet periods. Roots are influenced by the water table and are mainly confined to the upper 18 to 24 inches of the soil in spring. A few roots penetrate to a greater depth as the water table recedes. Available water capacity is low. Because of excellent water penetration in the root zone, the moisture that is supplied to crops is very effectively increased by rains during the growing season rather than being lost through runoff and evaporation. Permeability is moderate or moderately rapid in the surface layer and subsoil and is rapid in the substratum. Runoff is slow to medium. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and subsoil.

Most of the acreage of this soil is used for cultivated crops, fruit crops, hay, or pasture. This soil has good potential for farming, but it is not well suited to many uses in community development.

This soil is suited to crops, hay, and pasture. The seep spots and runoff from adjacent soils are important limitations. In most places, wetness delays planting for a brief period. Random subsurface drains are needed in the wetter included soils so that crops can be planted early in spring. The hazard of erosion is moderate if this soil is cultivated and not protected. Minimum tillage, use of cover crops, contour farming, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation help to improve tilth, maintain the content of organic matter, and reduce the hazard of erosion. Gravel and small stones cause some difficulty in tillage. Applied lime and fertilizer are leached from this soil at a moderately rapid rate; consequently, response is generally better to smaller but more frequent or timely applications than to one large application.

Fruit crops are suited to this soil. Some compaction is a continuous problem because spraying operations are commonly performed during wet periods with heavy equipment. Artificial drainage, maintaining good sod cover, and use of lighter machinery with wider tire treads or use of specially designed machinery help prevent soil compaction.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

Because of the seasonal high water table, this soil has limitations for many urban uses. Many dwellings on this soil have wet basements in spring and in other excessively wet periods. This soil is better suited to dwellings without basements than to those with basements. Foundation drains and protective coatings on the exterior walls of basements are needed. In areas where this soil is used for septic tank absorption fields, rapid permeability in the substratum can cause contamination of ground water. Sloughing is a hazard in excavations in this soil.

This soil has potential for recreational uses even though wetness, gravel, and small stones interfere with many of these uses. This soil is a fair source of sand and gravel. Capability subclass IIe.

CkB—Cayuga silt loam, 3 to 8 percent slopes. This deep, gently sloping, well drained and moderately well drained soil formed in 20 to 40 inches of lake-laid clay and silt deposits over glacial till. It is mainly in the moderately well drained segment of the drainage range for the series. This soil is adjacent to or in old glacial lakebeds. Slopes are slightly convex or smooth. Most areas are oblong or irregular in shape and are 10 to 125 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of about 38 inches. The upper 7 inches is firm, yellowish brown silty clay loam; the next 14 inches is very firm, mottled, yellowish brown and light olive brown silty clay; and the lower 10 inches is very firm, mottled, olive brown gravelly silty clay loam and gravelly clay loam. The substratum to a depth of about 50 inches is olive brown gravelly clay loam.

Included with this soil in mapping are areas of somewhat poorly drained Churchville soils that are in slight depressions and along drainageways; some small areas of soils that have a surface layer of gravelly silt loam; and small areas of moderately well drained Cambridge and Mardin soils that formed in glacial till on the tops of knolls. Also included are spots of the Hudson and Rhinebeck soils in areas where the lake-deposited clay and silt cap is thicker.

This soil has a perched seasonal high water table at a depth of 18 to 36 inches in spring and in other excessively wet periods. Roots are mainly in the upper 24 inches of the soil, but a few roots extend below this depth. Available water capacity in the root zone is moderate to high. Permeability is moderate in the surface layer and is slow in the subsoil and substratum. Runoff is medium. Reaction is medium acid to neutral in the surface layer and in the main part of the subsoil. It is neutral or mildly alkaline immediately above the substratum.

Most of the acreage of this soil is used for crops, pasture, and woodland. This soil has good potential for farming and for some recreational uses, but it has limited potential for urban developments.

This soil is suited to cultivated crops, hay, and pasture. Seasonal wetness, slow permeability, and high content of clay and silt in the subsoil limit the use of this soil for special crops and fruit crops. Artificial drainage is needed in areas of the wetter included soils. This soil needs to be cultivated at the proper moisture condition because it is sticky when wet and fairly hard when dry. Hard clods and a crusty surface form if the soil is cultivated when wet. Planting when the soil is very dry generally results in poor seed germination. The hazard of erosion is severe in cultivated areas that are not protected. Standard management practices, for example, contour farming, minimum tillage, use of cover crops, incorporating crop residue into the soil, crop rotation, good fertilization, and pasturing and harvesting at the proper moisture condition, help to control erosion, improve tilth, and maintain the content of organic matter.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

The perched seasonal high water table and slow permeability in the subsoil and substratum are limitations for urban uses. This soil is better suited to buildings without basements than to those with basements. Footers need to extend to the underlying glacial till and below the depth of freezing. Foundation drains and protective coatings on the exterior walls of basements are needed. The subbase for roads needs to be thicker than that commonly used. Effluent from septic tank absorption fields seeps to the surface in this soil. Therefore, the septic tank absorption field needs to be much larger than those commonly installed. A vegetative cover maintained on the site during construction helps prevent erosion. Capability subclass IIe.

CkC—Cayuga silt loam, 8 to 15 percent slopes. This deep, well drained and moderately well drained, sloping soil formed in 20 to 40 inches of lake-laid clay and silt deposits over glacial till. It is near drainageways in areas adjacent to or in old glacial lakebeds. Slopes are short and complex. Most areas are long and narrow in shape and are 5 to 30 acres in size.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil extends to a depth of about 16 inches. It is firm, yellowish brown silty clay loam. The lower part of the subsoil is very firm, mottled, yellowish brown silty clay to a depth of 26 inches and very firm, mottled, olive brown, gravelly silty clay loam to a depth of 32 inches. The substratum to a depth of about 50 inches is olive brown gravelly clay loam.

Included with this soil in mapping are moderately well drained Cambridge and Mardin soils that formed in glacial till and are in narrow strips on the upper part of slopes; small areas of Churchville soils that are wetter than this Cayuga soil and are in small depressions and in drainageways; spots of deep Hudson soils that are in areas where the lake-deposited clay and silt cap is thicker; and some small areas of soils that have a surface layer of gravelly silt loam. Also included are some small spots of an eroded soil that has a surface layer of silty clay loam.

This soil has a perched seasonal high water table at a depth of 18 to 36 inches in spring and in other excessively wet periods. Roots are mainly confined to the upper 24 inches of the soil, but a few roots extend below this depth. Available water capacity in the root zone is moderate to high. Permeability is moderate in the surface layer and is slow in the subsoil and substratum.

Runoff is rapid. Reaction is medium acid to neutral in the surface layer and in the main part of the subsoil. It is neutral or mildly alkaline immediately above the substratum.

Most of the acreage of this soil is used for crops, pasture, and woodland. This soil has fair potential for farming and limited potential for urban developments. It has potential for woodland and for some recreational uses, such as paths and trails.

This soil is suited to cultivated crops, but it is best suited to hay and pasture. Slope causes some difficulty in farming operations. Seasonal wetness, high content of clay and silt in the subsoil, and slow permeability in the subsoil and substratum also limit the suitability of this soil for special crops and fruit crops. If this soil is intensively used for intertilled crops, erosion is a major hazard. If proper management and conservation measures are practiced, intertilled crops can be grown, but the cropping system needs to include a high proportion of sod-forming crops and pasture. This soil needs to be cultivated at the proper moisture condition because it is sticky when wet and fairly hard when dry. Hard clods and a crusty surface form if the soil is cultivated when wet. Planting when the soil is very dry generally results in poor seed germination. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, contour farming, good fertilization, and pasturing and harvesting at the proper moisture condition, help to control erosion, improve tilth, and maintain the content of organic matter. The shallow waterways that cross some areas need special attention; some need permanent sod cover to control erosion, and some need drainage for wet spots.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

The perched seasonal high water table, slope, and slow permeability in the subsoil and substratum are limitations for most urban and recreational uses. Effluent from many septic tank absorption fields seeps to the surface in this soil. Therefore, the absorption field needs to be much larger than those commonly used. Footers need to extend to the underlying glacial till and below the depth of freezing. Foundation drains and protective coatings on the exterior walls of basements are needed. The subbase of roads needs to be thicker than that commonly used. The hazard of erosion is severe during construction. A vegetative cover maintained on the site during construction helps prevent erosion. Trails in recreational areas need protection from erosion and need to be established across the slope wherever possible. In some areas these soils are a suitable site for ponds. Capability subclass IIIe.

CnA—Chenango gravelly silt loam, 0 to 3 percent slopes. This deep, well drained to somewhat excessively drained, nearly level soil formed in glacial outwash. It is mainly on glacial outwash plains and fans. Areas are irregular in shape and are 5 to 50 acres in size.

Typically, the surface layer is brown gravelly silt loam about 9 inches thick. The upper part of the subsoil is friable, yellowish brown gravelly silt loam and gravelly loam to a depth of about 28 inches. The lower part of the subsoil to a depth of 35 inches is friable, brown very gravelly sandy loam. The substratum, to a depth of about 80 inches is dark brown very gravelly sand.

Included with this soil in mapping are small areas of Castile soils that are wetter than this Chenango soil and are in slight depressions; some areas of Hoosic soils, are intermingled with this soil but which are not extensive; some small areas of soils that have a surface layer of gravelly loam; and a few areas of soils that are near streams, are wetter and have a water table near a depth of 3 1/2 feet. Also included are areas of well drained Bath and Valois soils that formed in glacial till.

This soil warms up early in spring. After frost leaves the soil in spring, the level of free water falls rapidly. Roots are unrestricted and generally are below a depth of 30 inches for deep-rooted crops. Available water capacity is low to moderate. Droughtiness is a hazard in drier periods during the growing season. Permeability is moderate or moderately rapid in the surface layer and subsoil and is rapid in the substratum. Runoff is slow. In unlimed areas, reaction is very strongly acid or strongly acid above a depth of about 30 inches and is strongly acid to slightly acid below 30 inches.

Most of the acreage of this soil is used for cultivated crops, fruit crops, hay, or pasture. This soil has good potential for farming and for urban and recreational development.

This soil is well suited to a wide variety of crops. During prolonged dry periods, irrigation is needed, especially for shallow-rooted crops. Coarse gravel and cobblestones interfere with cultivation. Applied lime and fertilizer are leached from this soil at a moderate rate; consequently, response is generally better to smaller but more frequent or timely applications than to one large application. Minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation help to improve tilth and maintain the content of organic matter.

This soil is well suited to orchards and vineyards. These crops are deep-rooted, so they are not as susceptible to drought. Irrigation is still necessary for high production during prolonged dry periods. Spraying operations generally can be performed without excessive soil compaction.

Woodland productivity is high. Only a small acreage of this soil is wooded. Machine planting of tree seedlings is practical on this soil.

This soil is among the best soils in the county for a wide variety of urban uses. The included areas, where the water table fluctuates to within 3-1/2 feet of the surface, are poorly suited to buildings with basements.

Gravel and cobblestones interfere with most recreational uses. In areas where the soil is used for septic tank absorption fields, rapid permeability in the substratum can cause contamination of ground water. This soil is a good source of gravel and a fair source of sand. Capability subclass IIs.

CnB—Chenango gravelly silt loam, 3 to 8 percent slopes. This deep, well drained and somewhat excessively drained, gently sloping soil formed in glacial outwash. It is on the undulating parts of outwash plains and water-sorted deposits on moraines. Most areas are irregular in shape and are 5 to 75 acres in size.

Typically, the surface layer is brown gravelly silt loam about 9 inches thick. The upper part of the subsoil extends to a depth of 28 inches. It is friable, yellowish brown gravelly silt loam and gravelly loam. The lower part of the subsoil extends to a depth of about 35 inches. It is friable, brown very gravelly fine sandy loam. The substratum to a depth of about 80 inches is dark brown very gravelly sand.

Included with this soil in mapping are small areas of Castile soils that are wetter than this Chenango soil and are in slight depressions; some areas of somewhat excessively drained Hoosic soils that are intermingled with this soil but are not extensive; and some small areas of soils that have a surface layer of gravely loam. Also included are small areas of the well drained Bath and Valois soils that formed in glacial till.

This soil warms up early in spring. After frost leaves the soil in spring, the level of free water falls rapidly. Roots are unrestricted and commonly are below a depth of 30 inches for deep-rooted crops. Available water capacity is low to moderate. Droughtiness is a hazard in drier periods during the growing season. Permeability is moderate or moderately rapid in the surface layer and subsoil and is rapid in the substratum. Runoff is medium. In unlimed areas, reaction is very strongly acid or strongly acid above a depth of about 30 inches and is strongly acid to slightly acid below 30 inches.

Most of the acreage of this soil is used for cultivated crops and fruit crops, hay, or pasture. This soil has good potential for farming. Many areas have potential for urban and recreational developments.

This soil is suited to all crops commonly grown in the county. During prolonged dry periods, irrigation is needed, especially for shallow-rooted crops. Coarse gravel and cobblestones interfere with cultivation. Measures to conserve moisture, improve tilth, and maintain the content of organic matter, for example, minimum tillage, cover crops, incorporating crop residue into the soil, crop rotation, and tillage at the proper moisture condition, are needed. These measures and contour farming in areas that have simple slopes generally provide adequate water control. Applied lime and fertilizer are leached from this soil at a moderate rate; consequently, response is generally better to smaller but more frequent or timely applications than to one large application.

This soil is well suited to orchards and vineyards. These crops are deep-rooted so they are not as susceptible to drought. During prolonged dry periods, irrigation is still necessary for high production. Spraying operations generally can be performed without excessive soil compaction.

Woodland production is high. Only a small acreage of this soil is wooded. Machine planting of tree seedlings is practical on this soil.

This soil is one of the best soils in the county for a wide variety of urban uses. In some places, it is used for urban and recreational developments. Gravel and cobblestones interfere with most recreational uses. In areas where the soil is used for septic tank absorption fields, rapid permeability in the substratum can cause contamination of ground water. Erosion is a hazard during urban construction, especially on long, unprotected slopes. Sloughing is a hazard in excavations in this soil. This soil is a good source of gravel and a fair source of sand. Capability subclass IIs.

CnC—Chenango gravelly silt loam, 8 to 15 percent slopes. This deep, well drained and somewhat excessively drained, sloping soil formed in glacial outwash. It is on short terrace faces, kames, and water-sorted deposits on moraines. Most areas are long and narrow or irregular in shape and are 5 to 30 acres in size.

Typically, the surface layer is brown gravelly silt loam about 9 inches thick. The upper part of the subsoil extends to a depth of 28 inches. It is friable, yellowish brown gravelly silt loam and gravelly loam. The lower part of the subsoil extends to a depth of about 35 inches. It is friable, brown, very gravelly sandy loam. The substratum to a depth of about 80 inches is dark brown, very gravelly sand.

Included with this soil in mapping are small areas of well drained Bath and Valois soils that formed in glacial till; a few areas of Castile soils that are wetter than this Chenango soil and are near drainageways and on foot slopes; and areas of Hoosic soils that are on the upper part of some slopes. A few small areas of soils have a surface layer of gravelly loam.

Free water is in the upper 2 feet of this soil for only short periods during or immediately after soaking rains. Roots are unrestricted and commonly are below a depth of 30 inches for deep-rooted crops. Available water capacity is low to moderate. Droughtiness is a hazard in drier periods during the growing season. Permeability is moderate or moderately rapid in the surface layer and subsoil and is rapid in the substratum. Runoff is medium to rapid. In unlimed areas, reaction is very strongly acid or strongly acid above a depth of about 30 inches and is strongly acid to slightly acid below 30 inches.

Most of the acreage of this soil is used for cultivated crops, orchards, vineyards, hay, pasture, or woodland.

This soil has fair potential for farming. Slope limits most urban uses.

This soil is suited to small grain, hay, and pasture. If it is intensively used for intertilled crops, erosion is a major concern. If proper management and conservation measures are practiced, corn can be grown. Contour farming is practical in some areas, but other areas have short or complex slopes that cannot be farmed easily on the contour. Minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation are needed to improve tilth, maintain the content of organic matter, and reduce the hazard of erosion. Coarse gravel and cobblestones interfere with cultivation. Applied lime and fertilizer are leached from this soil at a moderate rate; consequently, response is better to smaller but more frequent or timely applications than to one large application.

This soil is suited to orchards maintained in permanent sod cover, but only moderately suited to vineyards. Because vineyards are cultivated, erosion is a hazard. Yields are reduced in some years because of lack of water. Spraying operations generally can be performed without excessive soil compaction.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

Even though slope limits many urban uses of this soil, most areas have potential for residential housing. Some areas are esthetic homesites. In areas where the soil is used for septic tank absorption fields, rapid permeability in the substratum can cause contamination of ground water. Erosion is a hazard during construction. A vegetative cover maintained on the site during construction helps to prevent erosion. Sloughing is a hazard in excavations in this soil. This soil is a good source of gravel and a fair source of sand. Capability subclass IIIe.

CvA—Churchville silt loam, 0 to 3 percent slopes. This deep, nearly level, somewhat poorly drained soil formed in 20 to 40 inches of lake-laid clay and silt deposits over glacial till. It is on plains adjacent to or in old glacial lakebeds. Some areas are in drainageways that receive runoff from adjacent soils. Areas are irregular in shape and are 5 to 80 acres in size.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil extends to a depth of about 39 inches. The upper 4 inches is firm, mottled, yellowish brown silty clay loam; the next 20 inches is very firm, mottled, dark brown and olive brown silty clay and light silty clay; and the lower 5 inches is very firm, olive brown clay loam. The substratum to a depth of about 54 inches is olive brown gravelly clay loam.

Included with this soil in mapping are narrow strips of Madalin and Canandaigua soils that are wetter than these Churchville soils and are in depressions and along drainageways; areas of well drained and moderately well drained Cayuga soils that are on low knolls; and areas of Rhinebeck and Hudson soils that are where the lake-deposited clay and silt cap is more than 40 inches thick. Also included are a few small areas of Volusia soils that formed in glacial till and Raynham soils that formed in silt and very fine sand.

This soil has a perched seasonal high water table at a depth of 6 to 18 inches in winter, in spring, and in other excessively wet periods. The depth of soil available for rooting ranges from 15 to 24 inches, but a few roots reach a greater depth as the water table recedes. Available water capacity in the root zone is moderate. Permeability is moderate in the surface layer, is slow or very slow in the subsoil, and is slow or moderately slow in the substratum. This soil is puddled and becomes cloddy, if it is cultivated when wet. Runoff is slow. Reaction is medium acid to neutral in the surface layer and is slightly acid to mildly alkaline in the subsoil.

Most of the acreage of this soil is used for hay, pasture, and woodland. Some areas are used for intertilled crops, and other areas are idle. This soil has fair potential for farming and limited potential for urban and recreational developments.

Drained areas of this soil are suited to cultivated crops, hay, and pasture. Undrained areas can be used for hay and pasture, but keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. Planting is delayed and the choice of crops limited in these undrained areas. Wetness, slow or very slow permeability, and the high content of clay and silt in the subsoil limit the suitability of this soil for special crops and fruit crops. Surface drainage is an important practice on this soil, but establishing adequate drainage outlets is a concern in some areas. Subsurface drains need to be closely spaced to give uniform drainage. Maintenance of good tilth is difficult in intensively cultivated areas. This soil needs to be cultivated at the proper moisture condition because it is sticky when wet and fairly hard when dry. Hard clods and a crusty surface form if it is cultivated when wet. Planting when the soil is very dry generally results in poor seed germination. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, crop rotation, good fertilization, and harvesting at the proper moisture condition, help to improve tilth and maintain the content of organic matter.

Undrained areas of this soil are suited to woodland and to wildlife habitat. Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil. Wetness limits the suitability of this soil for some species.

Because of the perched seasonal high water table and slow or very slow permeability in the subsoil and substratum, only a small acreage of this soil is used for urban and recreational developments. Many dwellings have wet basements. Foundation drains and protective coatings on the exterior walls of basements help to prevent this hazard. Footers need to be extended to the underlying glacial till and below the depth of freezing. Specially

designed septic tank absorption fields are needed. Roads need artificial drainage and a thick subbase. Capability subclass IIIw.

CvB—Churchville silt loam, 3 to 8 percent slopes. This deep, nearly level, somewhat poorly drained soil formed in 20 to 40 inches of lake-laid clay and silt deposits over glacial till. It is on broad, low ridges and on foot slopes in areas adjacent to or in old glacial lakebeds. Slopes are long and smooth.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil extends to a depth of about 39 inches. The upper 4 inches is firm, mottled, yellowish brown silty clay loam; the next 20 inches is very firm, mottled, dark brown and olive brown silty clay and light silty clay; and the lower 5 inches is very firm, olive brown clay loam. The substratum to a depth of about 54 inches is olive brown gravelly clay loam.

Included with this soil in mapping are small areas of Cayuga soils that are better drained than this Churchville soil and are on low ridges; narrow strips of wetter Madalin and Canandaigua soils that are in depressions and drainageways; some small areas of soils that have a surface layer of gravelly silt loam; and areas of Rhinebeck and Hudson soils where lakebed silt and clay sediment is more than 40 inches thick. Also included are a few areas of Volusia soils that formed in glacial till.

This soil has a perched seasonal high water table at a depth of 6 to 18 inches in winter, in spring, and in other excessively wet periods. The depth of soil available for rooting ranges from 15 to 24 inches, but a few roots reach a greater depth as the water table recedes. Available water capacity in the root zone is moderate. Permeability is moderate in the surface layer, is slow or very slow in the subsoil, and is slow or moderately slow in the substratum. This soil is puddled and becomes cloddy if it is cultivated when wet. Runoff is medium. Reaction is medium acid to neutral in the surface layer and is slightly acid to mildly alkaline in the subsoil.

Most of the acreage of this soil is used for crops, hay, pasture, and woodland. Some areas are idle. This soil has fair potential for farming and limited potential for urban and recreational developments.

Drained areas of this soil are suited to cultivated crops, hay, and pasture. Wetness, slow or very slow permeability, and the high content of clay and silt in the subsoil limit the suitability of this soil for crops that are planted early in spring and for special crops and fruit crops. Control of excess water is a major management need. Undrained areas can be used for hay and pasture, but keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. Surface drains and diversion terraces generally are effective in removing excess surface water. For adequate drainage, subsurface drains need to be closely spaced in this slowly or very slowly permeable soil. Controlling erosion and maintaining good tilth are difficult in intensively cultivated areas. This soil needs to be cultivated at the proper moisture condition because it is sticky when wet and hard when dry. Hard clods and a crusty surface form if it is cultivated when wet. Planting when the soil is very dry generally results in poor seed germination. Standard management practices, for example, minimum tillage, contour farming, use of cover crops, incorporating crop residue into the soil, crop rotation, good fertilization, and planting and harvesting at the proper moisture condition, help to improve tilth and maintain the content of organic matter.

Undrained areas of this soil are suited to woodland and to wildlife habitat. Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil. Wetness limits the suitability of this soil for some species.

Because of the perched seasonal high water table, low strength, and slow or very slow permeability in the subsoil and substratum, only a small acreage of this soil is used for urban and recreational developments. Many dwellings have wet basements. Foundation drains and protective coatings on the exterior walls of basements help prevent wetness in basements. Footers need to extend to the underlying glacial till and below the depth of freezing. Specially designed septic tank absorption fields are needed. Roads need artificial drainage and a thick subbase. A vegetative cover maintained on the site during construction helps to prevent erosion. Capability subclass IIIw.

FAE—Farmington-Rock outcrop complex, steep. This map unit consists of shallow, well drained and somewhat excessively drained, very stony Farmington soil and Rock outcrop. It is on hills and escarpments where relief is affected by bedrock. These soils are very stony. The Farmington soil formed in glacial till. It is intermingled with the Rock outcrop throughout the unit but is mainly on the lower part of slopes. Rock outcrop is on the upper part. Slope ranges from 25 to 35 percent. Individual areas are mainly long and narrow in shape and are 10 to 60 acres in size.

This unit is made up of about 45 percent Farmington very stony silt loam, 30 percent Rock outcrop, and 25 percent other soils. This Farmington soil and the Rock outcrop are in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Farmington soil is dark brown very stony silt loam about 3 inches thick. The subsoil extends to a depth of about 12 inches. It is friable, yellowish brown gravelly silt loam. Fractured limestone bedrock is at a depth of about 12 inches.

Included with this unit in mapping are small areas of a moderately deep, well drained soil on the lower part of slopes and a very shallow, excessively drained soil that is intermingled with the Rock outcrop. These included soils are similar to the Farmington soil but have bedrock at a depth of 20 to 40 inches and 5 to 10 inches

respectively. In a few areas, the Farmington soil is underlain with calcareous shale bedrock. Stockbridge, Valois, and Plainfield soils are on the lower part of some slopes. Many areas have slopes of 35 to 60 percent. Also included are very narrow strips of Canandaigua, Palms, and Raynham soils in low areas between hills.

Roots in the Farmington soil are mainly confined to the 10 to 20 inches of soil above the fractured limestone bedrock, but a few roots penetrate cracks. Because of shallowness to bedrock, available water capacity is low to very low. This soil is moderately permeable. Runoff is very rapid. Stones are subrounded or angular and are 10 inches to almost 4 feet across. They are spaced about 5 to 30 feet apart on the surface. Reaction is strongly acid to slightly acid in the surface layer and is medium acid to neutral in the subsoil.

Most areas of this unit are used for woodland and for wildlife habitat. Many abandoned limestone mines are in this unit. A few areas are quarried and are suited to this use. The unit has poor potential for farming and for urban developments and undisturbed areas are better suited to their natural state than to these uses. A few areas are scenic spots and have potential for recreational developments.

The steep slope, many bedrock outcrops, surface stoniness, and shallow depth to bedrock severely limit the use of this unit for crops and pasture.

Woodland productivity is poor on the Farmington soil. Seedling mortality is high. Use of equipment is limited because of slope and rock outcrops.

The steep slope, rock outcrops, surface stoniness, and shallow depth to bedrock cause difficulty in construction for urban developments. The hazard of erosion is high when vegetation is removed. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. Some areas have potential for quarrying and lookout points. Capability subclass VIIs.

FW—Fresh water marsh. This map unit consists of level, wet, periodically flooded areas where water is on or near the surface most of the year. The soil material varies from sand, silt, and clay to deep muck. Most areas have a mucky surface layer. A few areas along the Hudson River contain river dredgings. The most extensive areas are the tidal flats along the Hudson River where the water level fluctuates with the tide. Some areas in the uplands are naturally ponded, and others are around man-made lakes. These upland areas receive runoff from surrounding soils and are ponded most of the year. Most areas are oblong, irregular, or long and narrow in shape and are 5 to 70 acres in size.

Fresh water marsh supports a growth of marsh plants, for example, cattails, rushes, and water-tolerant shrubs. It generally does not support trees, except along the edges. These marshes are good habitat for muskrat, beaver, and other aquatic animals as well as waterfowl. They have poor potential for farming and for urban and recreational uses. In some areas, this unit is a suitable site for dugout ponds or wildlife marshes. Onsite investigation is needed to determine the feasibility of using specific areas. Capability subclass VIIIw.

Ha—Hamlin silt loam. This deep, nearly level, well drained soil formed in alluvium derived mainly from sandstone, siltstone, shale, and limestone. It is on first bottoms and is subject to flooding. Slope ranges from 0 to 3 percent. Areas are predominantly long and narrow in shape and are 10 to 75 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil extends to a depth of about 38 inches and is friable silt loam. It is dark grayish brown in the upper part and dark yellowish brown in the lower part. The substratum to a depth of about 58 inches is dark grayish brown silt loam.

Included with this soil in mapping are a few small areas of Teel soils that are wetter than this Hamlin soil and are in lower positions and some small areas of soils that have a surface layer of very fine sandy loam. Also included are narrow strips of well drained Tioga soils on flood plains and well drained Haven and moderately well drained Scio soils on stream terraces.

This soil is subject to flooding at any time of the year, but it commonly is flooded for brief periods when runoff is heavy late in fall, in winter, and in spring. Depth to the seasonal high water table, except during flooding, is 3 to 6 feet. This soil is open and porous, and roots commonly penetrate to a depth of 40 inches or more. Available water capacity is high. Permeability is moderate throughout the soil. This soil has good workability. Runoff is slow. Reaction is slightly acid or neutral in the surface layer and subsoil.

Most of the acreage of this soil is used for cultivated crops, special crops, hay, and pasture. This soil has good potential for farming and poor potential for most community development.

This soil is used intensively for row crops and vegetables. It has high productivity for all the crops commonly grown in the county. Because of the frost and flooding hazards, it is not suited to orchards and vineyards. In some areas, streambank erosion and gouging by floodwaters are hazards. This soil is easy to cultivate, and it responds well to good management. Poor tilth can result from intensive cropping. Consequently, such measures as minimum tillage, incorporating crop residue into the soil, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management.

Soil compaction is a concern because vegetables are sometimes harvested during wet periods. Use of lighter machinery with wider tire treads or use of specially designed machinery helps prevent soil compaction.

Woodland productivity is high. Only a very small acreage of this soil is in woodland. Machine planting of tree seedlings is practical on this soil.

The hazard of flooding severely limits community development. This soil has potential for such recreational uses as picnicking, golfing, and boating. Recreational buildings constructed on the flood plain need to be anchored. This soil is a good source of topsoil. Capability subclass IIw.

He—Haven loam. This deep, nearly level, well drained soil formed in water-sorted loamy material over stratified gravel and sand. It is on glacial-stream terraces. Slope ranges from 0 to 3 percent. Areas are mainly long and narrow in shape and are 5 to 30 acres in size.

Typically, the surface layer is dark brown silt loam about 11 inches thick. The upper part of the subsoil extends to a depth of about 22 inches. It is friable, yellowish brown loam. The lower part of the subsoil extends to a depth of about 25 inches. It is friable, dark brown gravelly loam. The substratum to a depth of about 60 inches is dark grayish brown and dark yellowish brown, very gravelly sand.

Included with this soil in mapping are small areas of moderately well drained Scio soils in slight depressions. Soils that are wetter than this Haven soil and that have a dense layer at a depth of about 30 inches, which restricts downward movement of water, are on the low terraces along Beaver Kill near Willow. Also included are a few areas of soils that have a surface layer of gravelly loam and narrow strips of well drained Tioga and Hamlin soils on flood plains.

This soil is slightly higher than the adjacent soils on flood plains. It is subject to rare flooding. Internal drainage is good. A seasonal high water table is at a depth of 4 to 8 feet. Roots are unrestricted, but are mainly in the upper 18 to 34 inches of the soil. A few deep-rooted crops obtain water at a greater depth. Available water capacity is moderate. Permeability is moderate in the surface layer, is moderate or moderately rapid in the subsoil, and is very rapid in the substratum. Surface runoff is slow. In unlimed areas, reaction is very strongly acid in the surface layer and is strongly acid or very strongly acid in the subsoil.

Most of the acreage of this soil is used for cultivated crops, hay, and pasture. This soil has good potential for farming, but it has limited potential for urban uses because of the hazard of flooding.

This soil is used intensively for cultivated crops, including special crops. It is also well suited to hay and pasture. Because of the frost hazard, this soil is not suited to orchards and vineyards. Crops can be planted early in spring. This soil is rarely flooded during the growing season, but flooding during abnormal conditions can cause crop loss. The main management concerns are keeping the soil from crusting after rains and maintaining tilth and a high level of fertility. Minimum tillage, incorporating crop residue into the soil, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management. Soil compaction is a problem because some vegetables are harvested during wet periods. Use of lighter machinery with wider tire treads or use of specially designed machinery helps prevent soil compaction.

Woodland productivity is moderately high. Only a very small acreage of this soil is in woodland. Machine planting of tree seedlings is practical on this soil.

The hazard of flooding limits urban uses of this soil. Most areas have potential for such recreational uses as picnicking, golfing, and boating. Recreational buildings need to be protected from flooding. In areas where the soil is used for septic tank absorption fields, very rapid permeability in the substratum can cause contamination of ground water. Sloughing is a hazard in excavations in this soil. This soil is a good source of sand and gravel. Capability class I.

HfA—Hoosic cobbly loam, 0 to 3 percent slopes. This deep, nearly level, somewhat excessively drained soil formed in glacial outwash. It is on stream terraces, outwash terraces, and fans. Most areas are long and narrow in shape or are roughly fan-shaped. Areas are 15 to 300 acres in size.

Typically, the surface layer is dark brown cobbly loam about 8 inches thick. The subsoil extends to a depth of about 23 inches. It is friable, strong brown, very cobbly sandy loam. The underlying material to a depth of 60 inches is dark brown, very gravelly sand.

Included with this soil in mapping are narrow strips of Alluvial land along streams. Tunkhannock soils are intermingled with this soil, but they are not extensive. Also included are small areas of soils that have a surface layer of gravelly loam and gravelly or cobbly sandy loam and a few areas of soils that have a water table below a depth of 3-1/2 feet.

Underground flow of water is common in the substratum of this soil. The water table level is generally below a depth of 6 feet. Roots of deep-rooted crops and trees penetrate the very gravelly substratum, but most crops obtain their water from the upper 22 to 30 inches of the soil. Available water capacity is very low to low. This soil dries out quickly after rains and causes shallow-rooted crops to wilt after a few rainless days. Permeability is moderately rapid in the surface layer and subsoil and is rapid or very rapid in the substratum. Runoff is slow. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and subsoil.

Most of the acreage of this soil is used for woodland, wildlife habitat, or dwellings. Some areas are idle. The soil has fair potential for farming. Many areas have good potential for dwellings and for industrial developments.

Only a small acreage of this soil is cultivated. The cobblestones hinder tillage and cause excessive wear of farm machinery (fig. 5). During dry periods, most crops are damaged by lack of moisture, unless they are irrigated. Increasing the content of organic matter and associated available water capacity of the soil are major con-

cerns in management. Incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation help to improve tilth and maintain the content of organic matter. Applied lime and fertilizer are rapidly leached from this soil; consequently, response is generally better to smaller but more frequent or more timely applications than to one large application.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on large areas of this soil.

In most areas, this soil is a suitable site for housing and industrial development. The included areas where the water table fluctuates to within 3-1/2 feet of the surface are poorly suited to buildings with basements. Cobblestones in the surface layer are limitations for some uses. This soil is a source of sand and gravel in most areas but the cobblestones and an occasional boulder in the substratum cause excessive wear of gravel-sieving equipment. Capability subclass IIIs.

HgA—Hoosic gravelly loam, 0 to 3 percent slopes. This deep, nearly level, somewhat excessively drained soil formed in glacial outwash. It is on outwash terraces, stream terraces, and fans. Areas vary considerably in shape and are as much as 200 acres in size.

Typically, the surface layer is dark brown, gravelly loam 8 inches thick. The subsoil extends to a depth of about 30 inches. The upper 6 inches is friable, yellowish brown gravelly loam; the next 6 inches is very friable, dark yellowish brown very gravelly sandy loam; and the lower 10 inches is very friable, dark yellowish brown very gravelly loamy sand. The underlying material to a depth of 80 inches is dark yellowish brown, crudely stratified, very gravelly sand.

Included with this soil in mapping are small areas of moderately well drained Castile soils in slight depressions; some areas of Chenango soils that are intermingled with this soil but are not extensive; some small areas of soils that have a surface layer of gravelly fine sandy loam and gravelly sandy loam; and a few unlimed areas of soils that are medium acid or slightly acid in the surface layer and upper part of the subsoil. Also included are areas of a soil that is similar to the Hoosic soil but has medium textured and moderately fine textured layers in the substratum below a depth of 3-1/2 feet. These areas and some other included areas near small streams or wetter associated soils have a seasonal high water table below a depth of 3-1/2 feet.

This soil is among the best drained soils in the county. It dries out quickly after rains and causes shallow-rooted crops to wilt after a few rainless days. Deep-rooted crops and trees penetrate the very gravelly substratum, but most crops obtain their water from the upper 22 to 35 inches of the soil. Available water capacity is very low to low. Permeability is moderately rapid in the surface layer and subsoil and is rapid or very rapid in the substratum. Runoff is slow. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and subsoil.

Most of the acreage of this soil is used for cultivated crops, fruit crops, hay, or pasture. This soil has fair potential for farming. It has good potential for housing and industrial development.

This soil is well suited to most crops and can be used intensively for row crops. Deep-rooted crops are especially suitable. This soil is not naturally a highly productive soil, but it responds well to good management. Droughtiness and gravel in the surface layer are the main limitations for crops. This soil responds well to irrigation. Applied lime and fertilizer are rapidly leached from this soil; consequently, response is generally better to smaller but more frequent or more timely applications than to one large application. Incorporating crop residue into the soil, use of cover crops, tillage at the proper moisture condition, and crop rotation help to improve tilth and maintain the content of organic matter.

This soil is suited to orchards and vineyards. These crops are deep-rooted and are not so susceptible to drought. Irrigation is necessary to maintain high production. Because the soil dries out quickly after rains, spraying operations generally can be performed without excessive soil compaction.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

This soil is one of the best soils in the county for many urban uses. Included soils in which the water table fluctuates to within 3-1/2 feet of the surface are poorly suited to buildings with basements. Gravel and cobblestones interfere with most recreational uses. In areas where the soil is used for septic tank absorption fields, rapid or very rapid permeability in the substratum can cause contamination of ground water. Sloughing is a hazard in excavations in this soil. This soil is a good source of gravel and a fair source of sand. Capability subclass IIIs.

HgB—Hoosic gravelly loam, 3 to 8 percent slopes. This deep, gently sloping, somewhat excessively drained soil formed in glacial outwash. It is on outwash terraces, stream terraces, and fans. This soil mainly is in large areas that vary in shape. Slopes are smooth, undulating, and convex.

Typically, the surface layer is dark brown gravelly loam about 8 inches thick. The subsoil extends to a depth of about 30 inches. The upper 6 inches is friable, yellowish brown gravelly loam; the next 6 inches is very friable, dark yellowish brown, very gravelly sandy loam; and the lower 10 inches is very friable, dark yellowish brown, very gravelly loamy sand. The underlying material to a depth of about 80 inches is dark yellowish brown, crudely stratified, very gravelly sand.

Included with this soil in mapping are small areas of moderately well drained Castile soils in slight depressions; some areas of Chenango soils that are intermin-

gled with this soil but are not extensive; and some small areas of soils that have a surface layer of gravelly fine sandy loam and gravelly sandy loam. Also included are areas of a soil that is similar to the Hoosic soil but has medium textured and moderately fine textured layers in the substratum below a depth of 3-1/2 feet.

This soil has better drainage than most other soils in the county. It dries out quickly after rains and causes shallow-rooted crops, to wilt after a few rainless days. Deep-rooted crops and tree roots penetrate the very gravelly substratum, but most crops obtain their water from the upper 22 to 35 inches of the soil. Available water capacity is very low to low. Permeability is moderately rapid in the surface layer and subsoil and is rapid or very rapid in the substratum. Runoff is slow to medium. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and subsoil.

Most of the acreage of this soil is used for cultivated crops, fruit crops, hay, or pasture. This soil has fair potential for farming. Many areas have potential for urban and recreational developments.

This soil is well suited to most crops. It is droughty, but it responds well to irrigation. The content of gravel in the surface layer generally hinders tillage. Applied lime and fertilizer are rapidly leached from this soil; consequently, response is generally better to smaller but more frequently or more timely applications than to one large application. Under intensive farming practices, the hazard of erosion is moderate. Minimum tillage, use of cover crops, contour farming, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation help to improve tilth, maintain the content of organic matter, and reduce the hazard of erosion.

This soil is well suited to deep-rooted fruit crops. Irrigation is necessary for substained high production. Because this soil dries out quickly after rains, spraying operations generally can be performed without excessive soil compaction.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

This soil is one of the best soils in the county for many urban uses. Gravel and cobblestones interfere with most recreational uses. In areas where the soil is used for septic tank absorption fields, rapid or very rapid permeability in the substratum can cause contamination of ground water. Sloughing is a hazard in excavations in this soil. This soil is a good source of gravel and a fair source of sand. Capability subclass IIIs.

HgC—Hoosic gravelly loam, rolling. This deep, somewhat excessively drained soil formed in glacial outwash. This soil is mainly on outwash terraces and kames that have complex slopes, but in a few places it is also on faces of outwash terraces that have smooth slopes. Slopes range from 5 to 16 percent. Areas of this soil are generally irregular in shape and are 5 to 200 acres in size.

Typically, the surface layer is dark brown gravelly loam about 8 inches thick. The subsoil extends to a depth of about 30 inches. The upper 6 inches is friable, yellowish brown gravelly loam; the next 6 inches is very friable, dark yellowish brown, very gravelly sandy loam; and the lower 10 inches is very friable, dark yellowish brown, very gravelly loamy sand. The underlying material to a depth of about 80 inches is dark yellowish brown, crudely stratified, very gravelly sand.

Included with this soil in mapping are small areas of Castile and Red Hook soils in depressions and nearly level areas that are wetter than this Hoosic soil and in most places are shown on the soil map by a wet spot symbol. Also included are small areas of soils on the tops and sides of kames that have a surface layer of gravelly sandy loam and also included at the base of some hillocks are narrow strips of well drained Bath and Valois soils that formed in glacial till.

This somewhat excessively drained soil dries out early in spring. Wilting of shallow-rooted crops generally occurs after a few rainless days. Deep-rooted crops and trees penetrate the very gravelly substratum, but most crops obtain their water from the upper 22 to 35 inches of the soil. Available water capacity is very low to low. Permeability is moderately rapid in the surface layer and subsoil and is rapid or very rapid in the substratum. Runoff is medium to rapid. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and subsoil.

Most of the acreage of this soil is used for orchards, vineyards, hay, pasture, or woodland. This soil has poor potential for cultivated crops. It has potential for orchards that are maintained in permanent sod cover and for most urban and recreational developments.

This soil is poorly suited to cultivated crops. It can be cropped successfully, but a high proportion of long-term hay or pasture is needed in the cropping system. It is most productive for deep-rooted crops, for example, alfalfa, because of the droughtiness. Conservation of moisture is very important. Gravel hinders tillage in some areas. Prevention of erosion is a major concern, especially if slopes are long. Contour farming is impossible in most areas because of the complex slopes. Minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture content, and crop rotation help to improve tilth, maintain the content of organic matter, and reduce the hazard of erosion. Applied lime and fertilizer are rapidly leached from this soil; consequently, response is generally better to smaller but more frequent or more timely applications than to one large application.

This soil is suited to orchards that are maintained in permanent sod cover, but only moderately suited to vineyards. Because vineyards are cultivated, erosion is a hazard. Yields are reduced in some years because of lack of water. Because this soil dries out quickly after

rain, spraying operations generally can be performed without excessive soil compaction.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

Even though the slope limits many urban uses of this soil, most areas are good homesites. In areas where the soil is used for septic tank absorption fields, rapid or very rapid permeability in the substratum can cause contamination of ground water. Sloughing is a hazard in excavations in this soil. This soil is a good source of gravel and a fair source of sand. Capability subclass IVs.

HgD—Hoosic gravelly loam, 15 to 25 percent slopes. This deep, moderately steep, somewhat excessively drained soil formed in glacial outwash. It is on the faces of outwash terraces and on kames. Slopes in the kame areas are short and complex, and the soil receives no runoff from adjacent soils. In the other areas slopes are short, but tip in one direction. Areas are irregular or long and narrow in shape and are 5 to 40 acres in size.

Typically, the surface layer is dark brown gravelly loam about 5 inches thick. The subsoil extends to a depth of about 25 inches. The upper 6 inches is friable, yellowish brown gravelly loam; the next 6 inches is very friable, dark yellowish brown, very gravelly sandy loam; and the lower 8 inches is very friable, dark yellowish brown, very gravelly loamy sand. The underlying material to a depth of about 80 inches is dark yellowish brown, crudely stratified, very gravelly sand.

Included with this soil in mapping are areas of well drained and somewhat excessively drained Tunkhannock soils in the valleys of the Catskill Mountains. A few included areas between kames contain Castile and Red Hook soils that are wetter than these Hoosic soils. Narrow strips of Valois soils that formed in glacial till are on the base of some slopes. Also included are small areas of soils that have a surface layer of gravelly sandy loam, a few areas of the sandy Plainfield soils, and narrow strips of soils that have bedrock at a depth of 40 to 60 inches.

This somewhat excessively drained soil dries out early in spring. Wilting of shallow-rooted crops commonly occurs after a few rainless days. Deep-rooted crops and tree roots penetrate the very gravelly substratum, but most crops obtain their water from the upper 22 to 35 inches of the soil. Available water capacity is very low to low. Permeability is moderately rapid in the surface layer and subsoil and is rapid or very rapid in the substratum. Runoff is rapid to very rapid. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and subsoil.

Most of the acreage of this soil is used for permanent pasture, orchards, and woodland; or it is idle. Because of slope, this soil has poor potential for farming. The best potential is for woodland and for wildlife habitat.

This soil is poorly suited to cultivated crops. It can be cropped sucessfully, but cropping systems should include a high proportion of long-term hay or pasture. This soil is well suited to early pasture. Because of slope, use of tillage equipment is very difficult, especially for larger machines. Lack of moisture is critical in many areas. The hazard of erosion is severe if the soil is cultivated and not protected. Minumum tillage and good fertilization are important in management. Contouring to control erosion and conserve moisture generally is not feasible.

Orchards that are maintained in permanent sod cover are suited to this soil, provided driving lanes are constructed to avoid the hazard of machinery upset. Because of droughtiness, production is low in some years. Because vineyards are cultivated, they are poorly suited to this soil.

Woodland productivity is moderately high. The slope presents some difficulty in machine planting of tree seedlings.

This soil is limited for most urban uses because of the slope. The hazard of erosion is severe during construction. Trench absorption fields are difficult to lay out and construct. Controlling the downhill flow of effluent is a serious concern. Rapid or very rapid permeability in the substratum can result in contamination of ground water by septic tank wastes. Sloughing is a hazard in excavations in this soil. This soil is a good source of gravel and a fair source of sand. Capability subclass IVe.

HSF—Hoosic soils, very steep. These deep, somewhat excessively drained soils formed in glacial outwash. They are on outwash terraces, escarpments, and kames. Slopes are short and range from 35 to 55 percent. Areas are generally long and narrow in shape. They are 5 to 60 acres in size.

Typically, the surface layer is dark brown gravelly sandy loam about 4 inches thick. The upper part of the subsoil extends to a depth of about 19 inches. It is friable, yellowish brown gravelly sandy loam. The lower part of the subsoil extends to a depth of about 23 inches. It is very friable, dark yellowish brown, very gravelly loamy sand. The substratum to a depth of 70 inches is dark yellowish brown, crudely stratified, very gravelly sand.

Included with these soils in mapping are areas of well drained and somewhat excessively drained Tunkhannock soils in the Catskill Mountains; some narrow strips of Valois soils that formed in glacial till are on the base of slopes; and many areas of soils that have slopes of 25 to 35 percent. Also included are areas of soils that are so severely eroded that the subsoil is exposed, small areas of sandy Plainfield soils, and a few narrow strips of soils that have bedrock at a depth of 40 to 60 inches.

These somewhat excessively drained soils dry out early in spring. Deep-rooted plants penetrate the very gravelly substratum, but most plants obtain moisture from the upper 22 to 30 inches of the soil. Available water capacity is very low to low. Permeability is moderately rapid in the surface layer and subsoil and is rapid

or very rapid in the substratum. Runoff is very rapid. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and subsoil.

Slope dominates the capabilities of these soils. Most areas are used for woodland and for wildlife habitat. These soils have poor potential for farming and for urban developments. Some areas are scenic spots and have potential for recreational developments.

These soils are not suited to crops because they are very steep, droughty, and subject to erosion. In a few areas, they provide limited grazing. Use of farm machinery is impractical and dangerous.

These soils are suited to trees. Woodland productivity is moderately high. The slope presents severe equipment limitatons.

The very steep slope causes difficulty in construction for urban developments. The hazard of erosion is high when vegetation is removed. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. These soils are good sources of gravel and fair sources of sand. Capability subclass VIIe.

HuB—Hudson silt loam, 3 to 8 percent slopes. This deep, gently sloping, moderately well drained soil formed in lake-laid deposits of clay and silt. It is on low knolls and ridgetops on dissected lake plains and on other glacial landforms that are mantled with lake sediment. Slopes are slightly convex or smooth. Most areas are irregular in shape and are 5 to 50 acres in size.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsurface layer is leached, yellowish brown light silty clay loam about 8 inches thick. The subsoil extends to a depth of 38 inches. The upper 10 inches of the subsoil is very firm and plastic, mottled, dark yellowish brown silty clay loam, and the lower 13 inches is very firm and plastic, mottled, yellowish brown silty clay. The underlying material to a depth of about 60 inches is mottled, dark yellowish brown, varved silty clay and silt loam.

Included with this soil in mapping are small areas of Rhinebeck soils that are wetter than this Hudson soil and are in slight depressions and along drainageways; a few areas of Cayuga soils, that are intermingled with this soil but are not extensive; and a few narrow strips of a soil that is similar to the Hudson soil but has limestone or shale bedrock at a depth of 20 to 40 inches. Also included are small areas of eroded soils that have a surface layer of silty clay loam and small areas of a soil that is similar to the Hudson soil but has silt loam in the upper part of the subsoil to a depth of 20 or 25 inches.

This soil has a perched seasonal high water table at a depth of 18 to 36 inches late in winter, in spring, and in other excessively wet periods. Roots are mainly confined to the upper 24 inches of the soil, but a few roots extend below this depth. Available water capacity in the root zone is moderate to high. Permeability is moderately slow in the surface layer and is slow in the subsoil and substratum. This soil is puddled and becomes cloddy if it is cultivated when wet. Runoff is medium. Reaction is strongly acid to neutral in the surface layer and subsoil.

Most of the acreage of this soil is used for crops, pasture, and woodland. This soil has good potential for farming and for some recreational uses, but it has limited potential for urban developments.

This soil is suited to cultivated crops, hay, and pasture. Seasonal wetness, slow permeability, and high content of clay and silt in the subsoil limit the suitability of this soil for special crops and fruit crops. Seasonal wetness delays planting in some years. Artificial drainage is needed in areas of the wetter included soils. This soil needs to be cultivated at the proper moisture condition because it is sticky when wet and fairly hard when dry. Hard clods and a crusty surface form if the soil is cultivated when wet. Planting when the soil is very dry generally results in poor seed germination. The hazard of erosion is severe in cultivated areas that are not protected. Standard management practices, for example, contour farming, minimum tillage, use of cover crops, incorporating crop residue into the soil, crop rotation, good fertilization, and pasturing and harvesting at the proper moisture content, help to control erosion, improve tilth, and maintain the content of organic matter. Random drainage of the included wet spots is beneficial in some fields.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

The perched seasonal high water table, low strength, and slow permeability in the subsoil and substratum are limitations for urban uses. This soil is better suited to dwellings without basements than to those with basements. Spread footings, foundation drains, and protective coatings on the exterior walls of basements are needed. Effluent from many septic tank absorption fields seeps to the surface in this soil. Therefore, the absorption field should be much larger than those commonly used. The subbase of roads needs to be thicker than that commonly used. Erosion is a hazard during construction. A vegetative cover maintained on the site helps prevent erosion. Capability subclass IIe.

HuC—Hudson silt loam, 8 to 15 percent slopes. This deep, moderately well drained, sloping soil formed in lake-laid deposits of clay and silt. It is in dissected areas of lake plains and other landforms that are mantled with lake sediment. Slopes are mainly short and convex. Areas are long and narrow or irregular in shape and are 5 to 80 acres in size.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsurface layer is leached, yellowish brown, light silty clay loam about 4 inches thick. The upper part of the subsoil extends to a depth of about 21 inches. It is very firm and plastic, yellowish brown silty clay loam and has mottles below a depth of 17 inches.

The lower part of the subsoil extends to a depth of 34 inches. It is very firm and very plastic, mottled, yellowish brown silty clay. The underlying material to a depth of about 60 inches is mottled, light olive brown, varved silty clay and silt loam.

Included with this soil in mapping are areas of Rhinebeck soils that are similar to but wetter than this Hudson soil and are in low lying positions near drainageways; a few areas of Cayuga soils that are on the upper part of slopes; and a few narrow strips of a soil that is similar to the Hudson soil but has limestone or shale bedrock at a depth of 20 to 40 inches and is mainly near rock outcrops. Also included are many small spots of an eroded soil that has a surface layer of silty clay loam.

This soil has a perched seasonal high water table at a depth of 18 to 36 inches late in winter, in spring, and in other excessively wet periods. Roots are mainly in the upper 24 inches of the soil, but a few roots extend below this depth. Available water capacity in the root zone is moderate to high. Permeability is moderately slow in the surface and subsurface layers and is slow in the subsoil and substratum. This soil is puddled and becomes cloddy if it is cultivated when wet. Runoff is rapid. Reaction is strongly acid to neutral in the surface layer and subsoil.

Most of the acreage of this soil is used for crops, pasture, and woodland. This soil has fair potential for farming and limited potential for urban developments. It has potential for woodland and for some recreational uses, such as paths and trails.

This soil is suited to cultivated crops, but it is best suited to hay and pasture. The slope causes some difficulty in farming operations. Seasonal wetness, high content of clay and silt in the subsoil, and slow permeability in the subsoil and substratum also limit the suitability of this soil for special crops and fruit crops. If this soil is intensively used for intertilled crops, erosion is a major hazard. If proper management and conservation measures are practiced, intertilled crops can be grown, but the cropping system should include a high proportion of sod-forming crops and pasture. This soil needs to be cultivated at the proper moisture condition because it is sticky when wet and fairly hard when dry. Hard clods and a crusty surface form if the soil is cultivated when wet. Planting when this soil is very dry generally results in poor seed germination. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, contour farming, good fertilization, and pasturing and harvesting at the proper moisture condition, help to control erosion, improve tilth, and maintain the content of organic matter. The shallow waterways that cross some areas need special attention; some need permanent sod cover to control erosion, and others need drainage for wet spots.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

The perched seasonal high water table, low strength, slope, and slow permeability in the subsoil and substratum limit most urban and recreational uses. Effluent from many septic tank absorption fields seeps to the surface in this soil. Therefore, the absorption field should be much larger than those commonly installed. Spread footings are needed because of low strength in the soil. Foundation drains and protective coatings on the exterior walls of basements are needed. Cut slopes are subject to slippage. The subbase of roads needs to be thicker than that commonly used. The hazard of erosion is severe during construction. A vegetative cover maintained on the site during construction helps prevent erosion. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. In some areas, this soil is a suitable site for ponds. Capability subclass IIIe.

HvC3—Hudson and Schoharie silty clay loams, 8 to 15 percent slopes, severely eroded. This map unit consists of moderately well drained Hudson soils and moderately well drained and well drained Schoharie soils on dissected lake plains. These deep, severely eroded, sloping solid formed in lake-laid deposits of clay and silt. Sheet erosion is severe on these soils, and small rills are common in fields that are cultivated up and down the slope. Slopes are short and convex. Most areas are long and narrow in shape and are 5 to 20 acres in size.

Areas of this unit consist of Hudson silty clay loam, of Schoharie silty clay loam, or of both soils.

Typically, the surface layer of the Hudson soil is brown silty clay loam about 6 inches thick. The subsoil extends to a depth of 27 inches. The upper 8 inches of the subsoil is very firm and plastic, dark yellowish brown silty clay loam and has mottles in the lower 2 inches. The lower 13 inches is very firm and plastic, mottled, yellowish brown silty clay. The underlying material to a depth of 60 inches is mottled, light olive brown, varved silty clay and silt loam.

Typically the surface layer of the Schoharie soil is reddish brown silty clay loam about 7 inches thick. The subsoil to a depth of 29 inches is firm and very firm, reddish brown silty clay. It has mottles below a depth of 11 inches. The substratum to a depth of about 50 inches is mottled reddish brown, varved silty clay and silty clay loam.

Included with these soils in mapping are narrow strips of Rhinebeck and Odessa soils that are similar to, but wetter than, these Hudson and Schoharie soils and are in low-lying positions near drainageways and small areas on the upper part of some slopes of Cayuga soils that have glacial till below a depth of 20 to 40 inches. Also included are many small areas of soils that are mainly on the lower part of slopes and are not so severely eroded as these Hudson and Schoharie soils; these areas have a surface layer of silt loam.

Hudson and Schoharie soils have a perched seasonal high water table at a depth of 18 to 36 inches in wet periods. Roots are mainly confined to the upper 20 inches of these soils, but a few roots extend below this depth. Available water capacity in the root zone is moderate. Permeability in the subsoil and substratum is slow in the Hudson soils and is slow or very slow in the Schoharie soils. These soils have poor tilth and workability. Runoff is very rapid during intense rains. Reaction of the Hudson soil is medium acid to neutral in the surface layer and subsoil. In unlimed areas, reaction of the Schoharie soil is strongly acid to neutral in the surface layer and is medium acid to mildly alkaline in the subsoil.

Most of the acreage of these soils is used for crops, pasture, and woodland. The soils have poor potential for farming, especially for special crops and fruit crops. Low strength, seasonal wetness, slow or very slow permeability, and slope are limitations for urban developments. These soils have potential for woodland and for wildlife habitat.

These soils are suited to sod-forming crops and pasture. Intensive management is needed to improve soil structure and to control runoff and erosion if the soils are used for intertilled crops. These soils are difficult to work because of the slope and the heavy, plastic surface layer. Preparation of a good seedbed requires careful timing to assure proper moisture condition. These soils readily become cloddy and a crusted surface forms if they are cultivated when wet. Planting when the soil is very dry generally results in poor seed germination. In very dry seasons, the soils are droughty and numerous cracks form in the surface layer. Care should be taken to plow and plant on the contour. Standard management practices, for example minimum tillage, use of cover crops, incorporating crop residue into the soil, good fertilization, and pasturing and harvesting at the proper moisture condition, help to control erosion, improve tilth, and maintain the content of organic matter. Controlled grazing is desirable; overgrazing commonly causes sheet erosion. The shallow waterways that cross some areas of these soils need special attention; some need permanent sod cover to control erosion, and others need drainage for wet spots.

Woodland productivity is high. Machine planting of tree seedlings is practical on these soils.

These soils are generally not used for urban and recreational developments. Spread footings are needed because of low strength of the soils. Dwellings with basements need foundation drains and protective coatings on the exterior walls of basements. Because of slow or very slow permeability, septic tank absorption fields need to be much larger than those commonly installed. Cut slopes are subject to slippage. The subbase for roads needs to be thicker than that commonly used. The hazard of erosion is severe during construction. A vegetative cover maintained on the site during construction helps prevent erosion. Lawns are difficult to establish. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. They are slick and sticky when wet. In some areas these soils are a suitable site for ponds. Capability subclass IVe.

HwD—Hudson and Schoharie soils, 15 to 25 percent slopes. This map unit consists of moderately well drained Hudson soils and moderately well drained and well drained Schoharie soils on dissected lake plains. These deep, moderately steep soils formed in lake-laid deposits of clay and silt. The surface layer for both soils is silt loam or silty clay loam. Many areas are severely eroded. They are cut by shallow drainage channels that carry water only during wet periods. Individual areas are mainly long and narrow in shape and are 10 to 150 acres in size. Areas of this undifferentiated group consist of Hudson soils, of Schoharie soils, or of both soils.

Typically, the surface layer of the Hudson soil is dark brown silt loam about 6 inches thick. The upper part of the subsoil extends to a depth of 17 inches. It is very firm and plastic yellowish brown silty clay loam that has mottles below a depth of 14 inches. The lower part of the subsoil extends to a depth of 30 inches. It is very firm and plastic, mottled, yellowish brown silty clay. The underlying material to a depth of 60 inches is mottled, dark yellowish brown, varved silty clay and silt loam.

Typically, the surface layer of the Schoharie soil is brown silt loam about 5 inches thick. The upper part of the subsoil extends to a depth of about 12 inches. It is firm and plastic, reddish brown silty clay loam. The lower part of the subsoil extends to a depth of about 31 inches. It is very firm and plastic, reddish brown silty clay that has mottles below a depth of 15 inches. The substratum to a depth of 50 inches is mottled, reddish brown, varved silty clay and silty clay loam.

Included with these soils in mapping are narrow strips of Riverhead, Plainfield, and Tunkhannock soils on the upper part of slopes. A few narrow strips of soils that are similar to these soils and have bedrock at a depth of 20 to 40 inches are near rock outcrops. Some included areas of Lackawanna soils that formed in glacial till are in the Town of Shandaken. Also included are narrow strips of soils that are similar to these soils but are on the lower parts of slopes and have less clay in the substratum.

Hudson and Schoharie soils have a perched seasonal high water table in the lower part of the subsoil and in the substratum in wet periods. Roots are mainly confined to the upper 24 inches of these soils, but a few roots extend below this depth. Available water capacity in the root zone is moderate. Permeability is slow in the subsoil and substratum of the Hudson soil and is slow or very slow in the Schoharie soil. These soils become puddled and cloddy if cultivated when wet. Runoff is very rapid. Reaction of the Hudson soils is strongly acid to neutral in the surface layer and subsoil. In unlimed areas of the

Schoharie soils, reaction is medium acid to neutral in the surface layer and is medium acid to mildly alkaline in the subsoil.

Because of slope, these soils have poor potential for farming. Most of the acreage is used for permanent pasture, woodland, and wildlife habitat. These soils have good potential for woodland and for wildlife habitat.

These soils are poorly suited to cultivated crops. They can be cropped successfully, but a high proportion of long term hay or pasture is needed in the cropping system. Use of tillage equipment is very difficult, especially for large machines. Erosion is a very severe hazard. These soils need to be cultivated at the proper moisture condition because they are sticky when wet and fairly hard when dry. Hard clods and a crusty surface form if the soils are cultivated when wet. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, contour farming, good fertilization, and pasturing and harvesting at the proper moisture condition, help to control erosion, improve tilth, and maintain the content of organic matter. Controlled grazing is desirable; overgrazing generally causes sheet erosion.

Woodland productivity is high. The slope presents some difficulty in machine planting tree seedlings.

Slope, slow or very slow permeability, low strength, and seasonal wetness are severe limitations for most urban and recreational uses. The hazard of erosion is severe during construction. These soils are subject to hillside slippage. Trench absorption fields are difficult to lay out and construct. Controlling the downhill flow of effluent is a serious concern. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. Capability subclass IVe.

HXE—Hudson and Schoharie soils, steep. This map unit consists of moderately well drained Hudson soils and moderately well drained and well drained Schoharie soils on dissected lake plains. These soils are dominantly on the sides of deep ravines, but also are on valley walls in a few areas. Many areas are cut by deep channels that carry water only during wet periods. These deep, steep soils formed in lake-laid deposits of clay and silt. Most areas are severely eroded. Slope ranges from 25 to 35 percent. Individual areas are long and narrow in shape and are 5 to 60 acres in size. Areas of this undifferentiated group consist of Hudson soils, Schoharie soils, or of both soils.

Typically the surface layer of the Hudson soil is dark grayish brown silty clay loam about 4 inches thick. The upper part of the subsoil extends to a depth of about 12 inches. It is very firm and plastic, mottled, yellowish brown silty clay loam. The lower part of the subsoil extends to a depth of about 26 inches. It is very firm and plastic, mottled, yellowish brown silty clay. The underlying material to a depth of about 60 inches is mottled, dark yellowish brown, varved silty clay and silt loam.

Typically, the surface layer of the Schoharie soil is dark reddish brown silty clay loam about 3 inches thick. The upper part of the subsoil extends to a depth of about 12 inches. It is firm and plastic, reddish brown silty clay loam. The lower part of the subsoil extends to a depth of 27 inches. It is very firm and very plastic, mottled, reddish brown silty clay. The substratum to a depth of about 50 inches is mottled, reddish brown, varved silty clay and silty clay loam.

Included with these soils in mapping are narrow strips of Riverhead, Plainfield, and Tunkhannock soils on the upper part of slopes; a few narrow strips of Lordstown and Nassau soils are near rock outcrops; and some small areas of Lackawanna soils that formed in glacial till are in the Town of Shandaken. Most of these included soils have slopes of 35 to 55 percent. Also included are narrow strips of soils that are similar to these Hudson and Schoharie soils but have less clay in the subsoil and substratum and are on the lower parts of slopes. These included soils are subject to mass slippage.

Hudson and Schoharie soils have a perched seasonal high water table in the lower part of the subsoil and in the substratum in excessively wet periods. Roots are mainly confined to the upper 20 inches of these soils, but a few roots extend below this depth. Available water capacity in the root zone is moderate to high. Permeability is slow in the subsoil and substratum of the Hudson soil and is slow or very slow in the Schoharie soil. These soils have poor workability. Runoff is very rapid. Reaction of the Hudson soil is strongly acid to neutral in the surface layer and subsoil. In unlimed areas of the Schoharie soil, reaction is medium acid to neutral in the surface layer and is medium acid to mildly alkaline in the subsoil.

Slope dominates the capabilities of these soils. Most areas are used for woodland and for wildlife habitat. These soils have poor potential for farming and for urban development. Where these soils are undisturbed, they need to be kept in their natural state. A few areas are scenic, and the soils have potential for recreational uses. ational uses.

Because of the steep slopes, these soils are very poorly suited to crops and pasture. Use of farm machinery is impractical and dangerous.

Woodland productivity is high. Slope limits the use of logging equipment.

The steep slope causes difficulty in construction for urban uses. The hazard of erosion is high when vegetation is removed. These soils are subject to slips and landslides. In a few areas, streams have undercut the base of slopes and masses of soil material have slipped downhill. Slope stability needs to be considered prior to cutting or filling. Steep slopes make the installation of septic sewage systems very difficult. Trails in recreational areas need to be protected from erosion and estab-

lished across the slope wherever possible. Capability subclass VIIe.

LaB—Lackawanna flaggy silt loam, 3 to 8 percent slopes. This deep, gently sloping, well drained soil formed in glacial till. It is on hill crests of glaciated uplands. Areas are long and narrow in shape, and most areas are 5 to 40 acres in size.

Typically, the surface layer is dark reddish brown flaggy silt loam about 7 inches thick. The upper part of the subsoil extends to a depth of about 17 inches. It is friable, reddish brown gravelly silt loam. The lower part of the subsoil extends to a depth of 60 inches. It is a very firm and brittle, dark reddish brown gravelly loam fragipan. The substratum to a depth of about 80 inches is weak red gravelly loam.

Included with this soil in mapping are small areas of moderately well drained Wellsboro soils and spots of Morris soils in slight depressions and on foot slopes. These two included soils make up as much as 15 percent of some areas. Also included are small areas of Oquaga soils that have bedrock at a depth of 20 to 40 inches.

Free water is generally at a depth of 2 to 4 feet for short periods late in fall, in winter, and early in spring. Because the fragipan is so dense, roots cannot easily penetrate it, so they are mainly confined to the 17 to 36 inches of soil above the slowly permeable fragipan and substratum. Available water capacity is low to moderate. Permeability is moderate in the surface layer and upper part of the subsoil. Runoff is medium. In unlimed areas, reaction is very strongly acid or strongly acid above the fragipan and is very strongly acid to medium acid in the fragipan.

Most of the acreage of this soil is used for hay and pasture. A few areas are cultivated. This soil has good potential for farming and has desirable sites in the uplands for buildings and other nonfarm uses.

This soil is suited to crops and pasture. Crops respond well to simple practices, for example, liming and fertilization. Small stones are a limitation in cultivating some crops and cause excessive wear of machinery. Erosion is a hazard in cultivated areas, especially if slopes are long. Standard management practices, for example, minimum tillage, contour farming, use of cover crops, crop rotation, and incorporating crop residue into the soil, help to control erosion, improve tilth, and maintain the content of organic matter.

Woodland productivity is moderately high. Only a small acreage of this soil is in woodland. Machine planting of tree seedlings is practical on this soil.

The slight seasonal wetness and slow permeability in the fragipan and substratum are limitations for many urban uses. This soil is better suited to dwellings without basements than to those with basements. Foundation drains and protective coatings on the exterior walls of basements are needed. Effluent from septic tank absorption fields seeps to the surface in this soil. The absorption field should be much larger than those commonly installed because of the slow permeability in the fragipan. This soil has potential for recreational uses, even though small stones and slow permeability interfere with many of these uses. Capability subclass IIe.

LaC—Lackawanna flaggy silt loam, 8 to 15 percent slopes. This deep, sloping, well drained soil formed in glacial till. It is on valley sides or hillcrests on glaciated uplands. Areas are long and narrow in shape, and most areas are 5 to 40 acres in size.

Typically, the surface layer is dark reddish brown flaggy silt loam about 7 inches thick. The upper part of the subsoil extends to a depth of about 17 inches. It is friable, reddish brown gravelly silt loam. The lower part of the subsoil extends to a depth of 60 inches. It is a very firm and brittle, dark reddish brown gravelly loam fragipan. The substratum to a depth of about 80 inches is weak red gravelly loam.

Included with this soil in mapping are small areas of moderately well drained Wellsboro soils, which make up as much as 10 percent of some areas, and somewhat poorly drained Morris soils on foot slopes and in some drainageways. Also included are narrow strips of Oquaga soils that have bedrock at a depth of 20 to 40 inches.

Free water is generally at a depth of 2 to 4 feet for brief periods late in fall, in winter, and early in spring. Because the fragipan is so dense, roots cannot easily penetrate it so they are mainly confined to the 17 to 36 inches of soil above the slowly permeable fragipan and substratum. Available water capacity is low to moderate. Permeability is moderate in the surface layer and upper part of the subsoil. Runoff is rapid. In unlimed areas, reaction is very strongly acid or strongly acid above the fragipan and is very strongly acid to medium acid in the fragipan.

Most of the acreage of this soil is used for hay, pasture, and woodland. A few areas are cultivated. This soil has fair potential for farming. It furnishes better sites in uplands than many other soils for nonfarming uses, for example, dwellings and paths and trails.

This soil is suited to crops and pasture. Use is somewhat limited because slope causes some difficulty in farming operations. Flagstones hinder tillage. Good response can be expected from applications of lime and fertilizer. Prevention of erosion is a major concern, especially if slopes are long. Sod-forming crops need to make up a large proportion of the cropping system. Standard management practices, for example, contour farming, minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation, help to control erosion, improve tilth, and maintain the content of organic matter.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

The slight seasonal wetness, slope, and slow permeability in the fragipan and substratum are limitations for many community development uses. Effluent from some septic tank absorption fields seeps to the surface in this soil. Absorption fields should be much larger than those commonly installed because of the slow permeability in the fragipan. In areas where public sewers are available, this soil is only moderately limited for residential housing. Foundation drains and exterior coatings on the walls of basements are needed. Erosion is a hazard during construction. A vegetative cover maintained on the site during construction helps prevent erosion. Capability subclass IIIe.

LCD—Lackawanna and Swartswood very bouldery soils, moderately steep. This map unit consists of deep, well drained soils on valley walls and ridgesides on glaciated uplands. These very bouldery soils formed in glacial till. Slope ranges from 15 to 25 percent. Most areas are long and narrow or irregular in shape and are about 20 to 700 acres in size.

Both soils are rarely in the same area. Areas generally consist of Lackawanna very bouldery soils or of Swartswood very bouldery soils. Lackawanna soils are mainly in the Catskill Mountains, and the Swartswood soils are in the Shawangunk Mountains and on the plateau adjacent to the Catskill Mountains. Because slopes and boulders are dominant in these soils and determine their use, these soils are not shown separately on the soil map.

Typically, the surface layer of the Lackawanna soil is dark reddish brown, very bouldery silt loam 3 inches thick under forest litter and humus. The upper part of the subsoil extends to a depth of about 17 inches. It is friable, reddish brown gravelly silt loam. The lower part of the subsoil extends to a depth of about 49 inches. It is a very firm and brittle, dark reddish brown gravelly loam fragipan. The substratum is dusky red gravelly loam that extends to a depth of about 80 inches.

Typically, the surface layer of the Swartswood soil is very dark grayish brown, very bouldery fine sandy loam about 4 inches thick. The upper part of the subsoil extends to a depth of about 33 inches. It is friable, strong brown gravelly sandy loam. The lower part of the subsoil extends to a depth of 60 inches. It is a very firm and brittle, olive brown gravelly sandy loam fragipan.

Included with these soils in mapping are areas of Oquaga and Lordstown soils that have bedrock within a depth of 20 to 40 inches; areas of moderately well drained Wellsboro and Wurtsboro soils that are near seeps and drainageways; some areas of Valois soils that are on the lower parts of valley walls where the glacial waters reworked the till and dense underlying glacial till is below a depth of 4 feet; and some areas on the lower slopes, mainly in the Esopus Creek Valley, of a soil that is similar to the Valois soil but has more clay than is typical. Most of the included soils have slopes of 25 to 35 percent. A few areas that were cleared for crops are nonbouldery. Also included are some areas of extremely bouldery soils that are too small to be mapped separately.

Free water is generally above the fragipan in these soils for brief periods late in fall, in winter, and early in spring. Because the fragipan is so dense, roots cannot easily penetrate it, so they are mainly confined to the 17- to 36-inch zone above the fragipan. Available water capacity of this zone is low to moderate in the Lackawanna soils and is very low to moderate in the Swartswood soils. Permeability is moderate above the fragipan in both soils, is slow in the fragipan and substratum of the Lackawanna soils, and is slow or moderately slow in the fragipan and substratum of the Swartswood soils. Runoff is very rapid. Boulders are dominantly 2 to 6 feet across and 1 to 2 feet thick, but many are smaller and a few are larger. Distance between boulders is quite variable, but it is generally 5 to 30 feet. Boulders cover 0.1 to 3 percent of the surface. In unlimed areas, reaction of the Lackawanna soils is very strongly acid or strongly acid in the surface layer. Reaction of the Swartswood soils is extremely acid to strongly acid in the surface layer.

Most of the acreage of these soils is used for woodland and wildlife habitat. These soils are well suited to these uses. They have poor potential for farming and for urban and most recreational uses.

A few areas of these soils are used for permanent pasture and hay. Pasture is generally unimproved and brushy. Boulders hinder fertilizing and mowing, and must be removed before the soils can be cultivated. If the soils are cultivated, the hazard of erosion is very severe. Contour farming, use of cover crops, crop rotation, minimum tillage, and good fertilization help to control erosion. These measures also help to conserve moisture and promote good tilth.

Woodland productivity is moderately high. Boulders cause difficulty in machine planting of tree seedlings. Logging roads and skid trails need to be well laid out and need to be protected from erosion with drainage dips or water bars.

Slope, boulders, slight seasonal wetness, and slow or moderately slow permeability in the fragipan and substratum are limitations for urban and recreational uses. The hazard of erosion is severe during construction. Trench absorption fields are difficult to lay out and construct. Controlling the downhill flow of effluent is a serious concern. Many areas have potential for use as paths and trails. Paths and trails need to be protected from erosion and established across the slope wherever possible. Capability subclass VIIs.

LCF—Lackawanna and Swartswood very bouldery soils, very steep. This map unit consists of deep, well drained soils on valley walls and V-shaped ravines in glaciated uplands. These very bouldery soils formed in glacial till. Slope ranges from 35 to 70 percent. Most

areas are long and narrow in shape and are 10 to 100 acres in size.

Both soils are rarely in the same area. Areas generally consist of Lackawanna very bouldery soils or of Swartswood very bouldery soils. Lackawanna soils are mainly in the Catskill Mountains, and the Swartswood soils are in the Shawangunk Mountains and on the plateau adjacent to the Catskill Mountains. Because slopes and boulders are dominant in these soils and determine their use, these soils are not shown separately on the soil map.

Typically, the surface layer of the Lackawanna soil is dark reddish brown, very bouldery silt loam 3 inches thick under the forest litter and humus. The upper part of the subsoil extends to a depth of about 28 inches. It is friable, reddish brown gravelly silt loam. The lower part of the subsoil extends to a depth of about 49 inches. It is a very firm and brittle, dark reddish brown gravelly loam fragipan. The substratum is dusky red gravelly loam that extends to a depth of about 80 inches.

Typically, the surface layer of the Swartswood soil is very dark grayish brown, very bouldery, fine sandy loam about 3 inches thick. The upper part of the subsoil extends to a depth of about 29 inches. It is friable, strong brown gravelly sandy loam. The lower part of the subsoil extends to a depth of about 50 inches. It is a very firm and brittle, olive brown gravelly sandy loam fragipan. The substratum to a depth of about 60 inches is dark yellowish brown gravelly sandy loam.

Included with these soils in mapping are areas of Valois soils that formed in glacial till and colluvium from a higher elevation and some areas of Lordstown and Oquaga soils that have bedrock at a depth of 20 to 40 inches. Also included are a few areas of extremely bouldery soils and small areas of eroded soils.

Free water generally is present above the fragipan in these soils for brief periods late in fall, in winter, and early in spring. Because the fragipan is so dense, roots cannot easily penetrate it, so they are mostly confined to the 17- to 36-inch zone above the fragipan. Available water capacity of this zone is low to moderate in the Lackawanna soils and is very low to moderate in the Swartswood soils. Permeability is moderate above the fragipan in both soils, is slow in the fragipan and substratum of the Lackawanna soils, and is slow or moderately slow in the fragipan and substratum of the Swartswood soils. Runoff is very rapid. In some areas, streams have undercut the very steep soils and have caused sections to slump and form escarpments. Boulders cover 0.1 to 3 percent of the surface of these soils and are spaced about 5 to 30 feet apart. They are mainly 1 to 4 feet thick and 2 to 10 feet across, but some are smaller. In unlimed areas, reaction of the Lackawanna soils is very strongly acid or strongly acid in the surface layer. Swartswood soils are extremely acid to strongly acid in the surface layer.

Most of the acreage of these soils is used for woodland and for wildlife habitat. The steepness of the slope and surface boulders prevent most uses other than woodland, recreation, and wildlife habitat. In some areas, these soils are scenic spots and have potential for recreational use.

Woodland productivity is moderately high. Slope and boulders present equipment limitations. Logging roads and skid trails need to be well designed and to be protected from erosion by drainage dips or water bars.

The very steep slope and surface boulders cause difficulty in construction for urban uses. The hazard of erosion is high when vegetation is removed. Trails in recreational areas need to be protected from erosion by drainage dips and need to be established across the slope wherever possible. Capability subclass VIIs.

LEE—Lackawanna and Swartswood extremely bouldery soils, steep. This map unit consists of deep, well drained soils that are mainly on valley walls or on the ridgesides below rock ledges in glaciated uplands. These extremely bouldery soils formed in glacial till. Slope ranges from 25 to 35 percent. Areas are long and narrow or irregular in shape and are 25 to 300 acres in size.

Most areas consist entirely of Lackawanna extremely bouldery soils or of Swartswood extremely bouldery soils. A few areas consist of both soils. Boulders and slope dominate the capabilities of this unit so much that the difference between the Lackawanna and Swartswood soils is relatively unimportant. Lackawanna soils are mainly in the Catskill Mountains, and the Swartswood soils are in the Shawangunk Mountains and on the plateau adjacent to the Catskill Mountains.

Typically, the surface layer of the Lackawanna soil is dark reddish brown, extremely bouldery silt loam 3 inches thick under the forest litter and humus. The upper part of the subsoil extends to a depth of about 23 inches. It is friable, reddish brown gravelly silt loam. The lower part of the subsoil extends to a depth of about 49 inches. It is a very firm and brittle, dark reddish brown gravelly loam fragipan. The substratum is dusky red gravelly loam that extends to a depth of about 80 inches.

Typically, the surface layer of the Swartswood soil is very dark grayish brown, extremely bouldery, fine sandy loam about 4 inches thick. The upper part of the subsoil extends to a depth of 29 inches. It is friable, strong brown gravelly sandy loam. The lower part of the subsoil extends to a depth of 55 inches. It is a very firm and brittle, olive brown gravelly sandy loam fragipan. The substratum to a depth of about 60 inches is dark yellowish brown gravelly sandy loam.

Included with these soils in mapping are Valois soils in glacial drainageways and on fans. A few areas of extremely bouldery Bath soils are included in the eastern part of the county. Moderately well drained Wellsboro and Wurtsboro soils are near seeps and drainageways. Most included soils have slopes of 15 to 25 percent. Some spots are included that are too small to be

mapped separately, or are very bouldery, and others are rubble land. Also included are Arnot, Lordstown and Oquaga soils that have bedrock within a depth to 40 inches.

Free water is generally above the fragipan in these soils for brief periods late in fall, in winter, and early in spring. Because the fragipan is so dense, roots cannot easily penetrate it, so they are mostly confined to the 17- to 36-inch zone above the fragipan. Available water capacity of this zone is low to moderate in the Lackawanna soils and is very low to moderate in the Swartswood soils. Permeability is moderate above the fragipan in both soils, is slow in the fragipan and substratum of the Lackawanna soils, and is slow or moderately slow in the fragipan and substratum of the Swartswood soils. Runoff is very rapid.

Boulders cover 3 to 15 percent of the surface of these soils. They are mainly 2 to 4 feet thick, 2 to 10 feet across, and spaced about 2 1/2 to 5 feet apart in most areas. The subsoil and substratum generally contain considerably less boulders than are on the surface layer. In unlimed areas, reaction of the Lackawanna soil is very strongly acid or strongly acid in the surface layer. Reaction of the Swartswood soil is extremely acid to strongly acid in the surface layer.

Most of the acreage of these soils is used for woodland and for wildlife habitat to which they are best suited (fig. 6). Steep slopes and surface boulders prevent most other uses. These soils have poor potential for farming.

Woodland productivity is moderately high. Slopes and surface boulders present concerns in the use of large machines in logging. Woodland plantings are extremely difficult to make. Logging roads and skid trails need to be well laid out and need to be protected from erosion with drainage dips or water bars.

Steep slopes and surface boulders cause extreme difficulty in construction for urban uses. The hazard of erosion is high when vegetation and the boulders are removed. Care should be taken when hiking on these extremely bouldery soils. Capability subclass VIIs.

Lm—Lamson fine sandy loam. This deep, poorly drained and very poorly drained, nearly level soil formed in water-sorted sediment of predominantly fine and medium sand. This soil is in basinlike depressions on lake plains and deltas where it receives runoff from higher soils. Slope is mainly less than 1 percent. Most areas are oblong in shape and are 15 to 150 acres in size.

Typically, the surface layer is very dark gray fine sandy loam about 10 inches thick. The friable subsoil extends to a depth of about 32 inches. The upper 7 inches is mottled, gray sandy loam; the next 5 inches is mottled, light olive brown sandy loam; and the lower 10 inches is mottled, dark gray, fine sandy loam. The underlying material is mottled, dark grayish brown loamy fine sand to a depth of about 44 inches, and below this it is stratified gray fine sandy loam and loamy fine sand to a depth of 50 inches.

Included with this soil in mapping are small areas of the poorly drained and very poorly drained Canandaigua soils that have a higher content of silt and clay than this Lamson soil; a few areas of somewhat poorly drained Walpole soils that are on slight rises; and some areas of very poorly drained Palms soils and Lamson soils that have a surface layer of mucky fine sandy loam. Also included are many areas of soils on the plateau adjacent to the Catskill Mountains that are very strongly acid or strongly acid in the surface layer. When this Lamson soil is near glacial till, small areas of Lyons and Menlo soils are included.

The seasonal high water table is at or immediately below the surface in winter, in spring, and after each rainy period, unless this soil is artificially drained. This soil receives water in surface runoff from surrounding soils and is often ponded during excessively wet periods. The depth of soil available for roots is mainly 10 to 20 inches and is related to the height of the water table. As the water table recedes, roots extend to a greater depth. Available water capacity in the root zone is low. Droughtiness is rarely a limitation in drained areas. Permeability is moderately rapid throughout the soil. Surface runoff is very slow. Reaction is medium acid to neutral in the surface layer and is slightly acid to mildly alkaline in the subsoil.

This soil is not used intensively. Most of the acreage is in woodland, is idle, or is used for pasture. This soil has fair to poor potential for farming and good potential for wetland wildlife.

Unless this soil is drained, it is too wet for cultivated crops. If adequately drained, it is suited to cultivated crops, hay, and pasture. Wetness is the main concern in management. A combination of surface and subsurface drains are needed in many areas. Drainage outlets are difficult to establish in many areas because of the basinlike topography. Filter material helps prevent subsurface drains from plugging with sand, which flows readily when the soil is saturated. Standard management practices, for example, minimum tillage, incorporating crop residue into the soil, crop rotation, use of cover crops, and tilling and harvesting at the proper moisture condition, are important.

Woodland productivity is moderate. Machine planting of tree seedlings is not practical except during the drier part of the growing season. Species that are tolerant of wetness need to be selected for reforestation.

Prolonged wetness severely limits community development and recreational uses. Even with artificial drainage and protective coatings on the exterior walls of basements, wet basements are common. Sloughing because of an unstable substratum is a hazard in excavations in this soil. Embankments for ponds are unstable. Capability subclass IVw.

LnB—Lordstown channery silt loam, 3 to 8 percent slopes. This moderately deep, well drained, gently sloping soil formed in glacial till. It is on terracelike benches and hilltops where relief is affected by bedrock. Most areas are long and narrow in shape and are 5 to 60 acres in size.

Typically, the surface layer is dark grayish brown channery silt loam about 8 inches thick. The friable, yellowish brown subsoil extends to a depth of about 34 inches. It is channery silt loam in the upper part and channery loam in the lower part. Gray sandstone bedrock is below a depth of about 34 inches.

Included with this soil in mapping are narrow strips of Tuller and Scriba soils that are wetter than this Lordstown soil and are in slight depressions and along drainageways. These wetter soils are generally indicated on the soil map by a special symbol. Also included are some large areas of a soil that is similar to the Lordstown soil but has a subsoil of gravelly fine sandy loam and are in the Ulster Heights-Sundown section of the county; a few small areas of Arnot soils that have bedrock at a depth of 10 to 20 inches; and small areas of the deeper Valois, Swartswood, and Wurtsboro soils.

Free water commonly is above the bedrock for a brief time after very rainy periods, but it is generally below a depth of 6 feet. The root zone is confined to the 20 to 40 inches of soil above the bedrock. Available water capacity is low to moderate. During dry years, droughtiness is a limitation in some areas. Permeability is moderate. Runoff is medium. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and subsoil.

Many farms in areas of this soil have been abandoned, and this soil is used for pasture or is reverting to forest. This soil has good potential for farming and limited potential for community developments.

This soil is suited to crops and pasture. It is not a highly productive soil, but it responds well to good management. Flat stone fragments hinder some tillage and harvesting operations. During prolonged dry periods, irrigation is needed, especially for shallow-rooted crops. Erosion is a hazard if this soil is cultivated and not protected. Management practices, for example, minimum tillage, cover crops, incorporating crop residue into the soil, contour farming, and crop rotation, are needed to conserve moisture, improve tilth, and control erosion. Liming and fertilization are also important.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

The hard bedrock at a depth of 20 to 40 inches limits the use of this soil for most community developments. Blasting of bedrock generally is required for most of these uses. Erosion is a hazard during construction, especially on long, unprotected slopes. Many areas have potential for such recreational uses as picnic and camp areas, even though flat stone fragments interfere with these uses. Capability subclass IIe.

LOC—Lordstown-Arnot-Rock outcrop complex, sloping. This map unit consists of a moderately deep, well drained Lordstown soil; a shallow, somewhat excessively drained to moderately well drained Arnot soil; and small areas of exposed bedrock. The soils formed in glacial till. They are in areas that have smooth slopes or have a stairstep appearance. The relief is affected by the underlying bedrock. The Lordstown soil is mainly on the base of slopes and on the back part of benches. The Arnot soil is intermingled with rock outcrops on slope breaks and on the front part of benches. Slope ranges from 8 to 15 percent. Areas are irregular in shape and are 15 to more than 1,000 acres in size.

This unit is made up of about 40 percent Lordstown channery silt loam, 30 percent Arnot channery silt loam, 15 percent Rock outcrop, and 15 percent other soils. These soils and the Rock outcrop form such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Lordstown soil in a wooded area is dark brown channery silt loam about 4 inches thick. The friable, yellowish brown subsoil extends to a depth of about 32 inches. It is channery silt loam in the upper part and channery loam in the lower part. Thick bedded gray sandstone and siltstone bedrock is below a depth of about 32 inches.

Typically, the surface layer of the Arnot soil in a wooded area is very dark grayish brown channery silt loam about 3 inches thick. The subsoil is friable, dark yellowish brown, very channery loam. Thick bedded gray sandstone and siltstone bedrock is at a depth of about 17 inches.

Included with these soils in mapping are Swartswood, Wurtsboro, Valois, Bath, and Mardin soils that are deep to bedrock; Tuller and Scriba soils that are along drainageways and in the flatter areas; and Schoharie and Odessa soils that are in small areas in the Alligerville section. Most areas of included soils have slopes of 2 to 8 percent, and many areas are very bouldery. Also included are small areas of Hoosic soils that are intermingled with the Arnot soils and Rock outcrop along some streams in the Napanoch and Ellenville sections. Also included are large areas of soils that are similar to these soils but have a subsoil of gravelly fine sandy loam and gravelly loam where the bedrock is quartz pebble conglomerate and sandstone.

Free water commonly is above the bedrock for a brief period in the Lordstown soil after very rainy periods, but it is generally below a depth of 6 feet. The root zone consists of the 20 to 40 inches of moderately permeable soil over the bedrock. Available water capacity is low to moderate.

The Arnot soil has free water above the bedrock for brief periods in spring and after heavy rains. The root zone consists of 10 to 20 inches of well aerated soil material over bedrock. A few roots penetrate fractures in

the bedrock in some areas. Available water capacity is very low, and plants wilt quickly during dry periods.

Permeability is moderate in both soils. Runoff is medium to rapid. In unlimed areas, the Lordstown soil is very strongly acid or strongly acid in the surface layer and subsoil. The Arnot soil is extremely acid to medium acid in the surface layer and subsoil.

Most of the acreage of these soils and the Rock outcrop is used for woodland and for wildlife habitat. Some areas are used for permanent pasture and homesites. The unit has poor potential for farming and for community development, but it has fair potential for some types of recreational development.

Farm uses are affected by the moderately deep and shallow depth to bedrock and by slope and rock outcrops. The unit is not suited to cultivation with large machinery. The rock outcrops hinder fertilizing and mowing of pasture. Good fertilization and controlled grazing are important in management.

Woodland productivity is moderately high on the Lordstown soil and poor on the Arnot soil. The rock outcrops interfere with machine planting of tree seedlings. Logging roads and skid trails need to be protected from erosion by drainage dips or water bars.

The shallow and moderately deep bedrock, slope, and rock outcrops severely limit most urban uses of this unit. Esthetic homesites are in some areas, but sites for sewage disposal are very limiting. A vegetative cover maintained on the site during construction helps prevent erosion. Most areas have potential for paths and trails, even though small stones and rock outcrops interfere with this use. Capability subclass VIs.

LY—Lyons-Atherton complex, very stony. This complex consists of deep, nearly level soils that formed in glacial till in depressions and along drainageways. Considerable amounts of runoff from the adjacent drier soils accumulate within these areas and cause ponding. The poorly drained and very poorly drained Lyons soil is on margins of the areas and the poorly drained to very poorly drained Atherton soil is in the middle. Slope ranges from 0 to 3 percent but is mainly 0 to 1 percent. Most areas are long and narrow in shape and are 5 to 50 acres in size.

This unit is made up of 55 percent Lyons very stony silt loam, 30 percent Atherton very stony silt loam, and 15 percent other soils. Lyons and Atherton soils are in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Lyons soil is very dark grayish brown, very stony silt loam about 9 inches thick. The upper part of the subsoil is firm, mottled, light gray light clay loam. The lower part of the subsoil extends to a depth of about 32 inches. It is firm, mottled, light brownish gray gravelly loam. The substratum to a depth of about 50 inches is mottled, dark grayish brown gravelly loam.

Typically, the surface layer of Atherton soil is very dark gray, very stony silt loam about 7 inches thick. The subsoil extends to a depth of about 30 inches. It is firm, mottled, gray gravelly silty clay loam in the upper part; and friable, mottled, brown gravelly loam in the lower part. The underlying material to a depth of about 65 inches is stratified gray sand, gravel, and very gravelly sandy loam.

Included within this unit are small areas of more silty Canandaigua soils and more sandy Lamson soils near the center of large basins and areas of somewhat poorly drained Volusia and Red Hook soils on slight rises. Also included are a few spots of Palms soils, small areas of soils that have a surface layer of mucky silt loam in the deeper parts of depressions; and a few areas of nonstony soils.

Undrained areas of these soils have water at or near the surface late in fall, in winter, and early in spring. Roots are confined mainly to the upper 10 to 15 inches of the soil. As the water table recedes, a few roots extend below this depth. Available water capacity of this zone is low to very low, but generally there is ample moisture for plant growth. Permeability in the Lyons soil is moderate or moderately slow in the subsoil and is slow or very slow in the substratum. Permeability in the Atherton soil is moderate in the surface layer and subsoil and is moderate or moderately slow in the substratum. Runoff is very slow. The stones are subrounded or angular in shape and are 10 inches to almost 4 feet across. The stones are 5 to 30 feet apart on the surface.

In unlimed areas, reaction in the Lyons soil is medium acid to neutral in the surface layer and is slightly acid or neutral in the subsoil. Reaction in the Atherton soil is strongly acid to neutral in the surface layer and upper part of the subsoil and is medium acid to mildly alkaline in the lower part of the subsoil.

Most of the acreage of these soils is used for woodland and for wetland wildlife habitat. These soils have poor potential for farming and for urban uses.

In the natural state, these soils are too wet and stony for cultivated crops. If these soils are adequately drained and the stones are removed, they are suitable for crops. Drainage outlets are difficult to locate in some areas. Diversion terraces are needed in some areas to divert surface runoff.

Woodland productivity is moderate. If these soils are reforested, species that are tolerant of wetness are needed. Wetness and surface stones cause difficulty in machine planting of tree seedlings.

Wetness, stoniness, and slow or very slow permeability in the Lyons soil are severe limitations for urban and recreational uses. In some areas, these soils are suitable for marshes and ponds, but each site needs to be investigated to be sure that water will not be lost through porous layers in the Atherton soil after the water table is lowered. Capability subclass VIIs.

Ma—Madalin silty clay loam. This deep, poorly drained and very poorly drained, nearly level soil formed in lake-laid deposits of clay and silt. It is on broad flats or in narrow drainageways in basins of old glacial lakes. Slope ranges from 0 to 2 percent. Most areas are long and narrow or oblong in shape and are 5 to more than 70 acres in size.

Typically, the surface layer is black silty clay loam about 9 inches thick. The upper part of the subsoil extends to a depth of about 35 inches. It is very firm, mottled, dark gray silty clay loam and silty clay. The lower part of the subsoil extends to a depth of about 45 inches. It is firm, mottled, brown silty clay. The substratum to a depth of 50 inches is mottled, dark yellowish brown, varved silty clay and silty clay loam.

Included with this soil in mapping are areas of Rhinebeck, Odessa, and Churchville soils that are better drained than this Madalin soil and are at a slightly higher elevation; several areas of this soil that are in associated areas of Churchville and Cayuga soils that are in the towns of New Paltz, Gardiner, and Shawangunk and are underlain with firm glacial till at a depth of 3-1/2 to 6 feet; and some areas of Canandaigua soils. Also included are small areas of soils that have a mucky surface layer and are shown on the soil map by the swamp or marsh spot symbol.

This soil has a seasonal high water table that is on or just below the surface in winter, in spring, and in other excessively wet periods. The depth of soil available for roots depends upon the height of the water table. The root zone is generally in the upper 10 to 18 inches, unless the soil has been adequately drained. Available water capacity in this zone is low. Permeability is moderately slow in the surface layer and is slow in the subsoil and substratum. Tilth in the silty clay loam surface layer is a concern in most areas. This soil receives runoff from surrounding soils and is often ponded during excessively wet periods. Runoff is very slow. Reaction is slightly acid or neutral in the surface layer and is slightly acid to mildly alkaline in the subsoil.

This soil is not intensively used. Wetness is the outstanding limitation. Most of the acreage is in woodland, is idle, or is used for pasture. This soil has poor potential for farming and good potential for wetland wildlife.

Undrained areas of this soil are too wet for cultivated crops and are limited mainly to pasture. If adequately drained, this soil is suitable for crops. Most areas are difficult to drain, and drainage outlets are difficult to locate in some areas. Open ditches and surface drains are the most effective drainage practices because of the slow permeability in the subsoil and substratum. Subsurface drains must be closely spaced to give uniform drainage. Maintenance of good tilth is difficult because the soil is sticky when wet and fairly hard when dry. If the soil is cultivated when wet, hard clods and a crusty surface form. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, crop rotation, and good fertilization, help to improve tilth and maintain the content of organic matter.

Even though woodland productivity is poor, many areas of this soil are suited to woodland and to wetland wildlife habitat. Machine planting of tree seedlings is not practical except during the drier part of the growing season. Species that are tolerant of wetness need to be selected for reforestation.

Prolonged wetness and slow permeability in the subsoil and substratum severely limit community development and recreational uses. Even with artificial drainage and protective coatings on the exterior walls of basements, wet basements are common. Spread footings are needed. Roads need artificial drainage and a very thick subbase. In many areas this soil is a suitable site for dugout ponds. Capability subclass IVw.

MdB—Mardin gravelly silt loam, 3 to 8 percent slopes. This deep, gently sloping, moderately well drained soil formed in glacial till. It is on convex hilltops and slightly concave foot slopes on till plains. Most areas of this soil are oblong in shape and are 5 to 30 acres in size.

Typically, the surface layer is dark brown, gravelly silt loam, about 10 inches thick. The upper part of the subsoil extends to a depth of about 17 inches. It is friable, yellowish brown gravelly silt loam that has mottles below a depth of 14 inches. A thin, leached layer of firm, mottled, pale brown gravelly loam 4 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil extends to a depth of 46 inches. It is a firm fragipan that is mottled, olive brown gravelly light loam. The substratum is firm, mottled, yellowish brown gravelly loam that extends to a depth of about 56 inches.

Included with this soil in mapping are small areas of somewhat poorly drained Volusia soils on foot slopes and in depressions. These Volusia soils make up about 10 percent of some areas. Well drained Bath soils are on slight rises and hilltops. Also included are narrow strips of Lordstown and Manlius soils that have bedrock at a depth of 20 to 40 inches.

Late in fall, in winter, and early in spring a temporary seasonal high water table is perched above the slowly permeable fragipan and substratum. Roots are mainly confined in the 14 to 26 inches of soil above the fragipan. Available water capacity of this zone is low to moderate. Permeability is moderate above the fragipan and slow in the fragipan and substratum. Runoff is medium. In unlimed areas, reaction is very strongly acid to medium acid above the fragipan and is very strongly acid to slightly acid in the fragipan.

This soil has good potential for farming. Most of the acreage is in fruit crops, cultivated crops, hay, and pasture. This soil is not well suited to many community development uses.

This soil is suited to cultivated crops. Seasonal wetness delays planting in some areas. Gravel and small stones cause concern in cultivating some crops and can cause excessive wear of machinery. Artificial drainage is needed for best crop response, especially in areas of the wetter included soils. Drainage of soils on foot slopes can be improved by diverting surface water commonly received from higher adjacent soils. Diversions and such practices as contour farming, cover crops and minimum tillage help to control erosion. Good fertilization, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation help to improve tilth and maintain the content of organic matter.

Fruit crops are suited to this soil. Soil compaction is a continuous concern because spraying operations are often performed during wet periods with heavy equipment. Artificial drainage, maintaining good sod cover, and use of lighter machinery with wider tire treads or use of specially designed machinery help prevent soil compaction.

Woodland productivity is moderately high. Only a small acreage of this soil is in woodland. Machine planting of tree seedlings is practical on large areas of this soil.

Because of the seasonal high water table and the slow permeability in the fragipan and substratum, this soil has limitations for many urban uses. Effluent from septic tank absorption fields seeps to the surface in this soil. The soil has potential for most recreational uses in many areas. Slow permeability and coarse fragments in the surface layer are limitations for some of these uses. Capability subclass IIe.

MgB—Mardin-Nassau complex, 3 to 8 percent slopes. This map unit consists of a deep, moderately well drained Mardin soil and a shallow, somewhat excessively drained Nassau soil. These gently sloping soils formed in glacial till. They are commonly in areas that have very low ridges that are cored by folded, shale, slate, siltstone, and sandstone bedrock. The ridges are generally oriented in a northeast-southwest direction. The Mardin soil is in slightly concave areas between the low ridges. The Nassau soil is on the tops and sides of the bedrock ridges. Most areas are irregular in shape and are about 10 to 1,000 acres in size.

This unit is made up of about 60 percent Mardin gravelly silt loam, 25 percent Nassau shaly silt loam, and 15 percent other soils. Mardin and Nassau soils are in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Mardin soil is dark brown gravelly silt loam about 10 inches thick. The upper part of the subsoil extends to a depth of about 17 inches. It is friable, yellowish brown gravelly silt loam that has mottles below a depth of 14 inches. A thin leached layer of firm, mottled, pale brown gravelly loam 4 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil extends to a depth of about 48 inches. It is a firm fragipan that is mottled, olive brown gravelly light loam. Dark gray shale bedrock is at a depth of about 48 inches.

Typically, the surface layer of the Nassau soil is brown shaly silt loam about 6 inches thick. The upper part of the subsoil extends to a depth of about 10 inches. It is very friable, yellowish brown very shaly silt loam. The lower part of the subsoil extends to a depth of 16 inches and is friable, brown, very shaly silt loam. Dark gray shale bedrock is at a depth of about 16 inches.

Included with these soils in mapping are small areas of Volusia soils that are wetter than this Mardin soil and are in slight depressions between ridges; narrow strips of moderately deep Manlius soils and deep Bath soils that are intermingled with the major soils throughout; and a few rock outcrops that are on ridges. Most of the outcrops and the wet spots are shown on the soil map by special symbols. Also included in a strip about 3 miles wide in the Wallkill and Shawangunk Kill Valleys are moderately well drained Cambridge soils in the Mardin position in the unit and few small areas of lake-deposited Raynham, Churchville, Rhinebeck, Odessa, Cayuga, Hudson, and Schoharie soils that are intermingled with the Mardin soil between ridges.

The Mardin soil has a temporary seasonal high water table that is perched above the slowly permeable fragipan and substratum late in fall, in winter, and early in spring. Roots are confined mainly to the 14- to 26-inch zone above the fragipan. Available water capacity of this zone is low to moderate. Depth to bedrock is more than 40 inches. Permeability is moderate above the fragipan and is slow in the fragipan and substratum.

Roots in the Nassau soil are confined mainly to the 10 to 20 inches of soil above the bedrock. A few roots penetrate fractures in the bedrock in some areas. Because of this shallowness to bedrock, available water capacity is very low, and plants wilt quickly during dry periods. The Nassau soil is moderately permeable.

Runoff is medium from both soils. In unlimed areas, the Mardin soil is very strongly acid to medium acid above the fragipan and is very strongly acid to slightly acid in the fragipan. In the Nassau soil, the surface layer and subsoil are very strongly acid or strongly acid.

These soils have fair potential for farming. Most of the acreage is in fruit crops, cultivated crops, hay, pasture, or woodland. The variable depth to bedrock, the slow permeability in the fragipan, and the seasonal wetness of the Mardin soil limit intensive use.

The undulating topography, occasional bedrock outcrops, and gravel and shale fragments hinder tillage. Available water capacity varies within short distances. The uneven topography is not suited to conservation practices other than sod-forming crops, minimum tillage, use of cover crops, and incorporating crop residue into the soil. Tillage at the proper moisture condition, crop rotation, and good fertilization help to improve tilth and maintain the content of organic matter. Seasonal wet-

ness of the Mardin soil delays planting in some areas. The included wetter soils need artificial drainage. The bedrock ridges make drainage difficult in many areas.

Fruit crops are suited to these soils if irrigation is available. During dry years, the very low available water capacity of the Nassau soils affects the size of fruit crops. Soil compaction is a continuous concern on the Mardin soil because spraying operations are often performed during wet periods with heavy equipment. Artificial drainage, maintaining good sod cover, and use of lighter machinery with wider treads or use of specially designed machinery help to prevent soil compaction.

Woodland productivity is moderately high on the Mardin soil and poor on the Nassau soil. Machine planting of tree seedlings is practical on large areas of these soils.

The variable depth to bedrock; the dense, slowly permeable fragipan; and seasonal wetness of the Mardin soil limit community development and recreational uses. The unit has potential for dwellings without basements if public sewers are available. A vegetative cover maintained on the site helps prevent erosion. Capability subclass IIIe.

Mn—Menlo silt loam. This deep, very poorly drained, nearly level soil formed in glacial till. It is in concave depressions and along drainageways on glacial till plains. This soil receives a large amount of runoff from adjacent higher areas. Slope ranges from 0 to 3 percent. Most areas are long and narrow in shape and are 5 to 25 acres in size.

Typically, the surface layer is very dark gray silt loam about 8 inches thick. The subsurface layer is leached, mottled, light gray gravelly fine sandy loam about 5 inches thick. The subsoil extends to a depth of about 45 inches. It is a very firm and brittle, mottled, dark yellowish brown gravelly fine sandy loam fragipan. The substratum is dark yellowish brown gravelly fine sandy loam that extends to a depth of 60 inches.

Included with this soil in mapping are small areas of a soil that is similar to this Menlo soil but does not have a fragipan and areas of Atherton, Canandaigua, Palms, and Lamson soils that are along drainageways and in the middle of the larger basins. Also included are Scriba and Morris soils on foot slopes, toe slopes, and low knolls.

This soil has a perched seasonal high water table that is on or just below the surface late in fall, in winter, in spring, and in other excessively wet periods. Because of wetness, this soil remains cold until late in spring, and plants grow slowly until the middle of May. Roots are confined mainly to the 12 to 25 inches of soil above the slowly or very slowly permeable fragipan and substratum. Available water capacity of this zone is low. Plants on this soil are rarely affected by lack of moisture. Permeability is moderate above the fragipan. Runoff is very slow. In unlimed areas, reaction is extremely acid to medium acid in the surface layer and is strongly acid to slightly acid in the fragipan and substratum.

This soil is not intensively used. Most of the acreage is used for pasture and woodland. This soil has poor potential for farming and for urban and recreational uses. It has good potential for wetland wildlife habitat.

Undrained areas of this soil are too wet for cultivated crops and are limited mainly to pasture or woodland. If this soil is adequately drained, it is suitable for crops. Most areas are difficult to drain. Open ditches and surface drains are the most effective practices to improve drainage because of the slow or very slow permeability in the fragipan and substratum. Subsurface drains must be closely spaced to give uniform drainage. Diversion terraces can be used in some cases to divert runoff from adjacent higher areas. Standard management practices, for example, minimum tillage, grazing at the proper moisture condition, incorporating crop residue into the soil, crop rotation, and good fertilization help to improve tilth and maintain the content of organic matter.

Woodland productivity is poor. Wetness causes difficulty in machine planting of tree seedlings. Species that are tolerant of wetness need to be selected for reforestation.

Prolonged wetness and slow or very slow permeability in the fragipan and substratum are severe limitations for community development and recreational uses. Even with artificial drainage and protective coatings on the exterior walls of basements, wet basements are common. In many areas this soil is a suitable site for dugout ponds. Capability subclass IVw.

MO—Menlo very bouldery soils. These deep, very poorly drained, nearly level soils formed in glacial till. They are in concave depressions and along drainageways on glacial till plains. These soils receive a large amount of runoff from adjacent higher areas. The surface layer is very bouldery silt loam, very bouldery loam, or very bouldery fine sandy loam. Slope ranges from 0 to 3 percent. Most areas are oblong or irregular in shape and are 10 to 60 acres in size.

Typically, the surface layer in a wooded area is black, very bouldery silt loam about 2 inches thick. The subsurface layer is leached, mottled, light gray gravelly fine sandy loam 11 inches thick. The subsoil extends to a depth of about 30 inches. It is a very firm and brittle, mottled, dark yellowish brown gravelly fine sandy loam fragipan. The substratum is dark yellowish brown gravelly fine sandy loam that extends to a depth of about 50 inches.

Included with these soils in mapping are small areas of Atherton, Canandaigua, Palms, and Lamson soils along drainageways and in the middle of larger basins. These included soils make up as much as 20 percent of some areas. Also included are areas of Scriba and Morris soils on foot slopes, toe slopes, and low knolls; a few small areas of nonbouldery and extremely bouldery soils; and

small areas of soil that are similar to Menlo soils but have bedrock at a depth of 20 to 40 inches.

These soils have a perched seasonal high water table that is on or just below the surface late in fall, in winter, in spring, and in other excessively wet periods. Because of wetness, these soils remain cold until late in spring, and plants grow slowly until the middle of May. Roots are mainly confined to the 12 to 25 inches of soil above the slowly or very slowly permeable fragipan and substratum. Available water capacity of this zone is low. Plants on these soils are rarely affected by lack of water. Permeability is moderate above the fragipan. Runoff is very slow. Boulders cover 0.1 to 3 percent of the surface of these soils. They are mainly 2 to 6 feet across and 1 to 2 feet thick, but some are smaller and a few larger. Distance between boulders varies but is generally 5 to 30 feet. In unlimed areas, reaction is extremely acid to medium acid in the surface layer and is strongly acid to slightly acid in the fragipan and substratum.

Most of the acreage of these soils is used for woodland and for wildlife habitat. These soils have poor potential for farming and for urban and recreational uses. They have good potential for wetland wildlife habitat.

These soils are too wet and bouldery for cultivated crops. Some areas are used for pasture of poor quality. The boulders are severe limitations to the use of large machines in fertilizing and mowing. Most areas are difficult to drain. Open ditches and surface drains are the most effective practices to improve drainage because of the slow or very slow permeability in the fragipan and substratum. Subsurface drains need to be very close together to give uniform drainage. Controlled grazing helps to maintain good soil tilth.

Woodland productivity is poor. Wetness and surface boulders present difficulty in machine planting of tree seedlings. Species that are tolerant of wetness need to be selected for reforestation.

These soils generally are not used for community development and recreational uses because of the prolonged wetness, surface boulders, and slow or very slow permeability in the fragipan. In many areas these soils are a suitable site for dugout ponds. Capability subclass VIIs.

Mr—Middlebury silt loam. This deep, nearly level, moderately well drained and somewhat poorly drained soil formed in alluvium derived mainly from shale and sandstone with some lime-bearing material. It is on first bottoms and is subject to flooding. Slope ranges from 0 to 2 percent. Most areas are long and narrow in shape and are 5 to 25 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil extends to a depth of about 25 inches. The upper 5 inches is friable, brown silt loam; the next 7 inches is friable, mottled, dark yellowish brown loam; and the lower 5 inches is very friable, mottled, dark brown fine sandy loam. The substratum extends to a depth of about 52 inches. The upper 6 inches is mottled, dark brown fine sandy loam; the next 8 inches is mottled, yellowish brown sandy loam; and the lower 9 inches is grayish brown and yellowish brown, stratified gravelly sandy loam.

Included with this soil in mapping are narrow strips of well drained Tioga soils that are in slightly higher, nearly level areas; narrow strips of Wayland soils that are wetter than this Middlebury soil and are in low areas; a few areas of soils that are in small stream valleys and that have a surface layer of gravelly silt loam or gravelly loam; and small areas of soils that have a surface layer of loam. Also included are a few small areas of more silty Teel soils on flood plains and narrow strips of Scio soils on stream terraces.

This soil may be flooded at any time of the year, but it generally is flooded for brief periods when runoff is heavy in winter and in spring. A seasonal high water table is at a depth of 6 to 24 inches late in winter, in spring, and in other excessively wet periods. Roots are controlled by the water table and are confined mainly in the upper 24 inches. Available water capacity of this zone is moderate. Permeability is moderate throughout the soil. Runoff is slow or very slow. In unlimed areas, reaction is strongly acid or medium acid in the surface layer and is medium acid to neutral at a depth of 40 inches.

Most of the acreage of this soil is used for crops, pasture, and woodland. This soil has good potential for farming, but it has poor potential for most community developments.

This soil is suited to crops, hay, and pasture. Special crops can be grown, but flooding may result in crop loss in some years. Flooding and seasonal wetness are the main limitations. Spring planting is delayed because of wetness. Artificial drainage increases yields and widens the choice of crops. Because of the frost and flooding hazards, this soil is not suited to orchards and vineyards. Keeping the soil from crusting after rains and maintaining tilth and a high level of fertility are also main management concerns. Minimum tillage, incorporating crop residue into the soil, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management. Soil compaction is a concern where this soil is used for sweet corn because harvesting is sometimes performed during wet periods. Use of lighter machinery with wider tire treads or use of specially designed machinery helps prevent soil compaction.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

The hazard of flooding and seasonal wetness seriously limit community developments. This soil has potential for such recreational uses as paths and trails, golfing, and boating. Recreational buildings need to be anchored when constructed on the flood plain. This soil is a good source of topsoil. Capability subclass IIw.

MTB—Morris-Tuller complex, very bouldery, gently sloping. This map unit consists of deep, somewhat poorly drained Morris soils and shallow, somewhat poorly drained to poorly drained Tuller soils. These soils formed in glacial till on glaciated uplands. Relief is affected by bedrock. Areas are in depressions or on benches on hillsides and foot slopes of mountains. The Morris soils are mainly in the middle of slight depressions and on the upper part of benches. The Tuller soils are on slope breaks on benches and the periphery of depressions. Areas are mainly long and narrow or oblong in shape and are 5 to 50 acres in size.

This unit is made up of about 45 percent Morris very bouldery silt loam and very bouldery loam, 30 percent Tuller very bouldery loam and very bouldery silt loam, and 25 percent other soils. Morris and Tuller soils are in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Morris soil is very dark grayish brown, very bouldery silt loam about 4 inches thick. The subsurface layer is leached, mottled, grayish brown flaggy silt loam 6 inches thick. The upper part of the subsoil extends to a depth of about 18 inches. It is friable, mottled, brown flaggy silt loam. The lower part of the subsoil extends to a depth of 54 inches. It is a very firm, mottled, reddish brown gravelly loam fragipan. The substratum is reddish brown gravelly loam that extends to a depth of 60 inches.

Typically, the surface layer of the Tuller soil is very dark grayish brown very bouldery silt loam about 7 inches thick. The subsoil extends to a depth of about 18 inches. It is friable, mottled, light brownish gray flaggy silt loam in the upper part and firm, mottled, brown, very flaggy very fine sandy loam in the lower part. Very dark gray sandstone bedrock is at a depth of about 18 inches.

Included with these soils in mapping are narrow strips of rock outcrop and moderately deep, somewhat poorly drained soils that are similar to the Morris soil but have bedrock at a depth of 20 to 40 inches. These included soils are in an intermediate position between Tuller and Morris soils on the landscape. Most areas have slopes of 0 to 3 percent and 8 to 15 percent. Small areas of Menlo soils are included in depressions. The Morris soils do not occur in the unit in the Shawangunk Mountains or on the plateau adjacent to the Catskill Mountains. In these areas, Scriba soils are with the Tuller soils. Also included are some spots of Red Hook soils and Alluvial land along small streams and narrow strips of Arnot, Lordstown, Oquaga, Wellsboro, and Wurtsboro soils that are better drained than these Morris and Tuller soils.

Late in fall, in winter, and early in spring, the Morris soils have a perched seasonal high water table above the fragipan at a depth of 6 to 18 inches. Roots are confined mainly to the 12 to 22 inches of soil above the fragipan and substratum. Available water capacity is low to very low in this zone. Depth to bedrock is more than 60 inches. Permeability is moderate above the fragipan and is slow or moderately slow in the fragipan and substratum.

The Tuller soils have a perched seasonal high water above the bedrock at a depth of 6 to 18 inches late in fall, in winter, in spring, and early in summer. Late in summer and early in fall, these soils sometimes become very dry because the root zone is confined to the 10 to 20 inches of soil above the bedrock. Available water capacity is very low to low. Permeability is moderate in the surface layer and is slow in the subsoil. Runoff is medium.

Boulders are mainly 2 to 6 feet across and 1 to 2 feet thick, but some are smaller and a few are larger. Distance between boulders varies but is generally 5 to 30 feet. Boulders cover about 0.1 to 3 percent of the surface of these soils. In unlimed areas, the Morris soils are very strongly acid to medium acid in the surface layer and upper part of the subsoil and are strongly acid to slightly acid in the fragipan. The Tuller soils are very strongly acid to medium acid throughout.

Most of the acreage of this unit is used for woodland and for wildlife habitat to which it is best suited. This unit has poor potential for farming and for urban and recreational uses.

These soils are too bouldery for cultivation. A few areas are used for hay and permanent pasture, but the boulders present severe limitations to the use of large machines in fertilizing and mowing. If boulders are removed, undrained areas are suited to mixtures of grasses and water-tolerant legumes for hay and pasture, but keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. Improvement of drainage is very difficult because of the shallow depth to bedrock of the Tuller soils. Blasting of bedrock is necessary for most drainage outlets.

Woodland productivity is moderately high on the Morris soils and poor on the Tuller soils. The boulders present difficulty in machine planting of tree seedlings. Wetness limits the suitability of these soils for some species.

The seasonal high water table, boulders, slow or moderately slow permeability, and shallow depth to bedrock of the Tuller soils severely limit most community development and recreational uses. The soils are better suited to dwellings without basements than to those with basements. Blasting of bedrock is generally required for installation of underground utilities. Capability subclass VIIs.

NBF—Nassau-Bath-Rock outcrop complex, very steep. This map unit consists of shallow, somewhat excessively drained Nassau soils; deep, well drained Bath soils; and Rock outcrop, or bedrock exposures that are intermingled mainly with the Nassau soils. These soils formed in glacial till. The Nassau soil generally is on the upper one-half to two-thirds of the slope, and the Bath

soil is on the lower part. Rock outcrop is on the hillsides, valleysides, and mountains. Slope ranges from 35 to 65 percent. Most areas are long and narrow in shape and are 10 to 100 acres in size.

This unit is made up of about 40 percent Nassau shaly silt loam and very shaly silt loam, 25 percent Bath gravelly silt loam and gravelly loam, 20 percent Rock outcrop, and 15 percent other soils. These soils and the Rock outcrop form such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Nassau soil is brown shaly silt loam about 3 inches thick. The upper part of the subsoil extends to a depth of 10 inches. It is very friable, yellowish brown, very shaly silt loam. The lower part of the subsoil extends to a depth of 16 inches and is friable, brown, very shaly silt loam. Dark gray shale bedrock is at a depth of about 16 inches.

Typically, the surface layer of the Bath soil is brown gravelly silt loam about 4 inches thick. The upper part of the subsoil extends to a depth of about 26 inches. It is friable, yellowish brown gravelly loam. The lower part of the subsoil extends to the dark gray shale bedrock at a depth of about 48 inches and is a firm, dark yellowish brown, gravelly loam fragipan.

Included with these soils in mapping are the moderately deep Manlius soils and shallow Arnot soils that are intermingled with the major soils throughout the unit and areas of Valois soils that are on the lower part of some slopes. Also included are small areas of Hoosic soils that formed in glacial outwash; Hudson and Schoharie soils that formed in lake deposits and are on valley walls; and many areas of soils that have slopes of 25 to 35 percent.

Roots in the Nassau soils are confined to the 10 to 20 inches of soil above the bedrock. A few roots penetrate fractures in the bedrock in some areas. Because of shallowness to bedrock, available water capacity is very low, and plants wilt quickly during dry periods. Permeability is moderate in the Nassau soils.

The Bath soils generally have free water above the fragipan for short periods late in fall, in winter, and early in spring. Roots are confined mainly to the 26- to 38-inch zone above the slowly permeable fragipan. Available water capacity is moderate. Depth to bedrock is more than 40 inches. Permeability is moderate in the surface layer and in the upper part of the subsoil.

Runoff is very rapid. In unlimed areas, the surface layer and subsoil of the Nassau soils are very strongly acid or strongly acid. The surface layer and subsoil of the Bath soils are very strongly acid to medium acid.

Most areas of this unit are used for woodland and for wildlife habitat. The soils have poor potential for farming and for urban developments. Undisturbed areas are better suited to uses that keep them in their natural state than to most other uses. A few areas are scenic spots and have potential for recreational developments.

The slope, many bedrock outcrops, and variable depth to bedrock limit the use of these soils for crops and pasture.

Woodland productivity is poor on Nassau soils and moderately high on Bath soils. Use of equipment is limited because of slope. Seedling mortality is high on the Nassau soils because of droughtiness.

The very steep slope, rock outcrops, and the shallow depth to bedrock of the Nassau soils make construction for urban uses difficult. The hazard of erosion is high when vegetation is removed. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. Capability subclass VIIs.

NMC—Nassau-Manlius shaly silt loams, rolling. This map unit consists of a shallow, somewhat excessively drained Nassau soil and a moderately deep, well drained and excessively drained Manlius soil. This unit is mainly on ridges. Relief is affected by bedrock and is very irregular. When viewed from a distance, large areas have a billowy appearance. The soils formed in glacial till. Generally, the Nassau soil is on the sides of ridges and ridgetops, and the Manlius soil is in the areas between ridges. Broad ridgetops contain both soils. Slope ranges from 5 to 16 percent. Most areas are 50 to 300 acres in size.

This unit is made up of about 40 percent Nassau shaly silt loam, 35 percent Manlius shaly silt loam, and 25 percent other soils and rock outcrops. These Nassau and Manlius soils are in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Nassau soil is brown shaly silt loam about 6 inches thick. The upper part of the subsoil extends to a depth of 10 inches. It is very friable, yellowish brown very shaly silt loam. The lower part of the subsoil extends to a depth of about 16 inches and is friable, brown very shaly silt loam. Dark gray rippable shale bedrock is at a depth of about 16 inches.

Typically, the surface layer of the Manlius soil is dark brown shaly silt loam about 6 inches thick. The upper part of the suboil extends to a depth of about 15 inches. It is very friable, light olive brown shaly silt loam. The lower part of the subsoil extends to a depth of 22 inches and is very friable, dark yellowish brown very shaly silt loam. The substratum to a depth of about 32 inches is a mass of fine shale fragments with thin brown silt loam coatings. The dark grayish brown, fractured, rippable shale bedrock is at a depth of about 32 inches.

Included with this unit in mapping are narrow strips of deep, well drained Valois and Bath soils that are between the ridges and on foot slopes; many areas of soils that have slopes of 2 to 5 percent and 16 to 25 percent; and small areas of very shallow soils that are similar to the Nassau soil but have bedrock at a depth of 5 to 10 inches and are on ridgetops. Also included are a few areas of rock outcrops and areas of the deep, well

drained and somewhat excessively drained Chenango soils along intermittent streams. Some very stony areas are shown on the soil map with stone symbols.

The root zone is confined to the 10 to 20 inches of soil above the bedrock in the Nassau soils. A few roots penetrate fractures in the bedrock in some areas. Because of shallowness to bedrock, available water capacity is very low, and plants wilt quickly during dry periods. Available water capacity is low to moderate in the 20- to 40-inch root zone above the shale bedrock in the Manlius soil. Excavations in the shale bedrock can be made by ripping with a heavy bulldozer or similar construction equipment. Other bedrock formations that are below the shale generally require blasting. Permeability is moderate in both soils. Runoff is medium to very rapid. In unlimed areas, the surface layer and subsoil of the Nassau soils is very strongly acid or strongly acid. The Manlius soil is extremely acid to strongly acid in the surface layer and is very strongly acid to medium acid in the subsoil.

This unit is used mainly for woodland and for wildlife habitat. A few areas are used for hay and pasture. Because of droughtiness, depth to bedrock, and irregular topography the soils have poor potential for farming. They have potential for some types of recreational development.

Because of droughtiness and a limited root zone, the soils are poorly suited to fruit crops, pasture, and hayland. Irrigation, addition of organic matter, and proper liming and fertilization are necessary for adequate production of forage crops.

Woodland productivity is poor on Nassau soils and moderately high on Manlius soils. Seedling mortality is high on the Nassau soil because of droughtiness.

These soils have limitations for most urban uses because of slope and the depth to bedrock. There are some esthetic homesites, but the bedrock can be very limiting. A vegetative cover maintained on the site helps to prevent erosion. This unit has potential for some recreational uses even though the shallow depth to bedrock, slope, and shale fragments on the surface layer present limitations for some uses. Capability subclass VIs.

NNF—Nassau-Manlius, complex, very steep. This map unit consists of shallow, somewhat excessively drained Nassau soils and a moderately deep, well drained and excessively drained Manlius soil. This unit is mainly on mountainsides. The soils formed in glacial till. Nassau soils generally are on the upper part of side slopes, and the Manlius soil is on the lower part. Slope ranges from 35 to 65 percent. Areas are mainly long and narrow in shape, but some areas are broad. They are 100 to 600 acres in size.

This unit is made up of about 35 percent Nassau shaly silt loam and very shaly silt loam, about 35 percent Manlius shaly slt loam, and 30 percent other soils and Rock outcrop. These Nassau and Manlius soils are in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Nassau soil is brown shaly silt loam about 3 inches thick. The upper part of the subsoil extends to a depth of 10 inches. It is very friable, yellowish brown very shaly silt loam. The lower part of the subsoil extends to a depth of 16 inches and is friable, brown very shaly silt loam. Dark gray rippable shale bedrock is at a depth of about 16 inches.

Typically, the surface layer of the Manlius soil is very dark brown shaly silt loam about 2 inches thick. The upper part of the subsoil extends to a depth of about 15 inches and is very friable, light olive brown shaly silt loam. The lower part of the subsoil extends to a depth of 22 inches and is very friable, dark yellowish brown very shaly silt loam. The substratum to a depth of about 32 inches is a mass of fine shale fragments that has thin brown silt loam coatings. Dark grayish brown fractured, rippable shale bedrock is at a depth of about 32 inches.

Included with this unit in mapping are deep, well drained Valois and Bath soils that are on foot slopes; small areas of very shallow soils that are similar to Nassau soils but have bedrock at a depth of 5 to 10 inches and are on the upper part of slopes; and many areas of soils that have slopes of 25 to 35 percent. Rock outcrop makes up 5 to 10 percent of this unit and is intermingled mainly with the Nassau soils.

The root zone is confined to the 10 to 20 inches of soil above the bedrock in Nassau soils. A few roots penetrate fractures in the bedrock in some areas. Because of this shallowness to bedrock, available water capacity is very low and plants wilt quickly during dry periods. Available water capacity is low to moderate in the 20- to 40-inch root zone above the shale bedrock in the Manlius soil. Excavations can be made by ripping with a heavy bulldozer or similar construction equipment. Other bedrock formations that are below the shale generally require blasting. Runoff is very rapid.

Permeability is moderate in both soils. In unlimed areas of Nassau soils, the surface layer and subsoil are very strongly acid or strongly acid. Manlius soils are extremely acid to strongly acid in the surface layer and are very strongly acid to medium acid in the subsoil.

Slope dominates the capabilities of this unit. This unit is used mainly for woodland and for wildlife habitat. It has poor potential for farming, but it has potential for some types of recreational development.

The very steep slope, droughtiness, and limited root zone are very severe limitations for farming.

Woodland productivity is poor on the Nassau soils and moderately high on the Manlius soil. Use of equipment is limited because of slope. Seedling mortality is high on the Nassau soils because of droughtiness.

The very steep slope and bedrock within 40 inches of the surface make construction for urban uses difficult. The hazard of erosion is high when vegetation is removed. Some of the higher areas could be developed as

lookout points. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. Capability subclass VIIs.

NOD—Nassau-Rock outcrop complex, hilly. This map unit consists of a shallow, somewhat excessively drained Nassau soil and Rock outcrop on ridges. The ridges are cored by folded, shale, slate, and sandstone bedrock. The Nassau soil formed in glacial till. It is on broad ridgetops and between ridges. Rock outcrop is mainly on ridgetops. Slope is mainly 10 to 25 percent, but ranges from 10 to 30 percent. Areas are mainly long and narrow or oblong in shape and are 25 to 150 acres in size.

This unit is made up of about 55 percent Nassau shaly silt loam, 20 percent Rock outcrop, and 25 percent other soils. The Nassau soil and Rock outcrop are in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Nassau soil is brown shaly silt loam about 6 inches thick. The upper part of the subsoil extends to a depth of 10 inches. It is very friable, yellowish brown very shaly silt loam. The lower part of the subsoil extends to a depth of 16 inches and is friable brown very shaly silt loam. Dark gray shale bedrock is at a depth of about 16 inches.

Included with this unit in mapping are moderately deep, well drained and excessively drained Manlius soils that are between ridges; some areas of soils that are very stony; and small areas of very shallow soils that are similar to the Nassau soil but have bedrock at a depth of 5 to 10 inches and are near rock outcrops. Also included are well drained Bath and moderately well drained Mardin soils that are on foot slopes and between ridges in some areas. Many areas of soils have slopes of 4 to 10 percent.

The root zone in the Nassau soil is confined to the 10 to 20 inches of soil above the bedrock. A few roots penetrate fractures in the bedrock in some areas. Because of shallowness to bedrock, available water capacity is very low, and plants wilt quickly during dry periods. Permeability is moderate. Runoff is medium to very rapid. In unlimed areas, the surface layer and subsoil are very strongly acid or strongly acid.

This unit is used mainly for woodland and for wildlife habitat. A few areas are in unimproved native pasture. The unit has poor potential for farming and urban development. It has potential for paths and trails.

Farm uses are affected by the droughtiness, shallow depth to bedrock, rock outcrops, and slope. Numerous outcrops make cultivation extremely difficult. They also hinder fertilizing and mowing of pasture.

Woodland productivity is poor on the Nassau soil. Seedling mortality is high. The rock outcrops interfere with machine planting of tree seedlings.

Urban uses are severely limited by the bedrock exposures, shallow depth to bedrock, and slope. Large quantities of fill generally are needed for disposal of septic tank effluent. In some cases, effluent from septic tanks moves over the bedrock to streams or comes to the surface at very shallow areas. A vegetative cover maintained on the site during consturction helps to prevent erosion. Capability subclass VIIs.

OdA—Odessa silt loam, 0 to 3 percent slopes. This deep, somewhat poorly drained, nearly level soil formed in lake-laid deposits of clay and silt. It is on broad flats or along drainageways on glacial lake plains. Areas along drainageways are long and narrow in shape and are 5 to 25 acres in size. These areas receive runoff from adjacent soils. Areas on broad flats are irregular in shape and are as much as 120 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil extends to a depth of about 38 inches. The upper 9 inches of the subsoil is firm, mottled, yellowish brown and brown silty clay loam; the next 17 inches is very firm, mottled, dark brown and reddish brown silty clay; and the lower 4 inches is very firm, reddish brown and yellowish brown, varved silty clay and silty clay loam. The substratum to a depth of about 50 inches is reddish brown and yellowish brown, varved silty clay and silty clay loam.

Included with this soil in mapping are small areas of Schoharie soils that are drier than this Odessa soil and are on low knolls; long narrow strips of wetter Madalin and Canandaigua soils that are in depressions and along drainageways; in the Pataukunk section of the county, a few areas of soil that have 8 to 30 inches of gravelly loam outwash, similar to the surface layer and upper part of the subsoil in Red Hook soils, over lake sediments; and a few areas of soil near Olive Bridge that have a surface layer of gravelly loam or gravelly silt loam. Also included are small areas of the silty Raynham soils.

This soil has a perched seasonal high water table at a depth of 6 to 18 inches in winter, in spring, and in other wet periods. The depth of soil available for rooting is related to the height of the water table and is mainly in the upper 15 to 24 inches. As the water table recedes, a few roots penetrate to a greater depth. Available water capacity is moderate in the root zone. Permeability is moderately slow in the surface layer, is slow or very slow in the subsoil, and is very slow in the substratum. This soil needs to be cultivated at a proper moisture condition because it is sticky when wet and fairly hard when dry. Runoff is slow. Reaction is medium acid to neutral in the surface layer and is medium acid to mildly alkaline in the subsoil.

Most of the acreage of this soil is used for hay, pasture, and woodland. Some areas are used for intertilled crops, and others are idle. This soil has fair potential for farming and limited potential for urban and recreational developments.

Drained areas of this soil are suited to cultivated crops, hay, and pasture. Undrained areas can be used

for hay and pasture, but keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. Planting is delayed and the choice of crops limited in these undrained areas. Wetness, slow or very slow permeability, and the high content of clay and silt in the subsoil limit the suitability of this soil for special crops and fruit crops. Surface drainage is an important practice on this soil, but establishing adequate drainage outlets is a concern in some areas. Subsurface drains must be closely spaced to give uniform drainage. Maintenance of good tilth is difficult in intensively cultivated areas. This soil needs to be cultivated at a proper moisture condition because it is sticky when wet and hard when dry. Hard clods and a crusty surface form if the soil is cultivated when wet. Planting when the soil is very dry generally results in poor seed germination. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, crop rotation, good fertilization, and planting and harvesting at the proper moisture condition, help to improve tilth and maintain the content of organic matter.

Undrained areas of this soil are suited to woodland and to wildlife habitat. Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil. Wetness limits the suitability of this soil for some species.

Because of the perched seasonal high water table, low strength of the soil, and very slow permeability, only a small acreage of this soil is used for urban and recreational uses. Many dwellings have wet basements. Foundation drains and protective coatings on the exterior walls of basements help prevent wet basements. Spread footings are needed because of the low strength of the soil. Specially designed septic tank absorption fields need to be installed. Roads need artificial drainage and a thick subbase. Capability subclass IIIw.

OdB—Odessa silt loam, 3 to 8 percent slopes. This deep, somewhat poorly drained, gently sloping soil formed in lake-laid deposits of clay and silt. It mainly is on very broad, low ridges with smooth slopes on glacial lake plains and other landforms that are mantled with lake sediment. Some areas are on gentle side slopes along waterways. Areas are irregular in shape and are 5 to 60 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil extends to a depth of about 38 inches. The upper 9 inches of the subsoil is firm, mottled, yellowish brown and brown silty clay loam; the next 17 inches is very firm, mottled, dark brown and reddish brown silty clay; and the lower 4 inches is very firm, reddish brown and yellowish brown, varved silty clay and silty clay loam. The substratum to a depth of about 50 inches is reddish brown and yellowish brown, varved silty clay and silty clay loam.

Included with this soil in mapping are small areas of Schoharie soils that are drier than this Odessa soil and are on the crests of low knolls; narrow strips of wetter Madalin and Canandaigua soils that are in depressions and waterways; and Churchville and Cayuga soils that are in areas where the lacustrine deposits are 20 to 40 inches thick over glacial till. Also included are a few areas of soil, between Olive Bridge and Big Indian, that have a surface layer of gravelly loam or gravelly silt loam and areas of Raynham soils that have less clay in the subsoil than this Odessa soil.

This soil has a perched seasonal high water table at a depth of 6 to 18 inches in winter, in spring, and in other excessively wet periods. The depth of soil available for rooting is related to the height of the water table and is mainly in the upper 15 to 24 inches. As the water table recedes, a few roots penetrate to a greater depth. Available water capacity is moderate in the root zone. Permeability is moderately slow in the surface layer, is slow or very slow in the subsoil, and is very slow in the substratum. This soil needs to be cultivated at a proper moisture condition because it is sticky when wet and hard when dry. Runoff is medium. Reaction is medium acid to neutral in the surface layer and is medium acid to mildly alkaline in the subsoil.

Most of the acreage of this soil is used for crops, hay, pasture, and woodland. Some areas are idle. This soil has fair potential for farming and limited potential for urban and recreational developments.

Drained areas of this soil are suited to cultivated crops, hay, and pasture. Wetness, high content of clay and silt in the subsoil, and slow or very slow permeability limit the suitability of this soil for crops planted early in spring and for special crops and fruit crops. Control of excess water is a major management need. Undrained areas can be used for hay and pasture, but keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. Surface drains and diversion terraces generally are effective in removing excess surface water. For adequate drainage, subsurface drains must be closely spaced in this slowly permeable soil. Controlling erosion and maintaining good tilth are difficult in intensively cultivated areas. This soil needs to be cultivated at a proper moisture condition because it is sticky when wet and hard when dry. Hard clods and a crusty surface form if the soil is cultivated when wet. Planting when very dry generally results in poor seed germination. Standard management practices, for example, minimum tillage, contour farming, use of cover crops, incorporating crop residue into the soil, crop rotation, good fertilization, and planting and harvesting at the proper moisture condition, help to improve tilth and maintain the content of organic matter.

Undrained areas of this soil are suited to woodland and to wildlife habitat. Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil. Wetness limits the suitability of this soil for some species.

Because of the perched seasonal high water table, low strength, and very slow permeability, only a small acreage of this soil is used for urban and recreational uses. Many dwellings have wet basements. Foundation drains and protective coatings on the exterior walls of basements help prevent this wetness. Spread footings are needed because of the low strength of the soil. Specially designed septic tank absorption fields need to be installed. Roads need artificial drainage and a thick subbase. Erosion is a hazard during construction. Capability subclass IIIw.

OgB—Oquaga channery silt loam, 3 to 8 percent slopes. This moderately deep, well drained and excessively drained, gently sloping soil formed in glacial till. It is on benches and ridgetops where relief is affected by bedrock. Most areas are long and narrow or irregular in shape and are 10 to 40 acres in size.

Typically, the surface layer is dark reddish brown channery silt loam about 7 inches thick. The friable, reddish brown subsoil is channery silt loam in the upper part and very channery loam in the lower part. Weak red shale bedrock is at a depth of about 32 inches.

Included with this soil in mapping are small areas of Arnot soils that have bedrock at a depth of 10 to 20 inches and small areas of Lackawanna, Valois, and Wellsboro soils that are deeper than this Oquaga soil. These soils make up as much as 20 percent of some areas. Narrow strips of Morris and Tuller soils that are wetter than this Oquaga soil are in slight depressions and along drainageways. These wetter soils are commonly indicated on the soil map by the symbols for wet spots and drainageways. Also included are a few areas of bedrock outcrops.

Free water is above the bedrock for brief periods after very rainy periods, but it is generally below a depth of 6 feet. The root zone consists of the 20 to 40 inches of soil over bedrock. In many places where the soil is shallower, especially over red shale, the upper layer of the bedrock is fractured and interspersed with fine soil particles. Plant roots obtain nutrients and moisture from these cracks. Available water capacity is low to moderate. Permeability is moderate. Runoff is medium. In unlimed areas, reaction is extremely acid to medium acid throughout the soil.

Many of the large farms have been abandoned, and this soil is used for pasture and hay or is reverting to forest. This soil has good potential for farming, but it has limited potential for community developments.

This soil is suited to crops and pasture. It is not naturally a highly productive soil, but it responds well to good management practices, for example, liming and fertilization. Flat stone fragments hinder some tillage and harvesting operations. Erosion is a hazard if this soil is cultivated and not protected. Measures to conserve moisture, improve tilth, and control erosion, for example, minimum tillage, cover crops, incorporating crop residue into the soil, contour farming, and crop rotation are needed.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

Bedrock at a depth of 20 to 40 inches limits this soil for most community developments. Many areas have esthetic qualities and panoramic views for homesites, but sites for sewage disposal can be very limiting. Erosion is a hazard during construction, especially on long unprotected slopes. Many areas have potential for picnic and camp areas even though flat stone fragments interfere with these uses. Capability subclass IIe.

OlC—Oquaga and Lordstown channery silt loams, 8 to 15 percent slopes. This map unit consists of moderately deep, sloping soils on ridgesides and ridgetops and on mountainsides in glaciated uplands. The Oquaga soil is well drained and excessively drained, and the Lordstown soil is well drained. These soils formed in glacial till and have sandstone, siltstone, or shale bedrock at a depth of 20 to 40 inches. Most areas are long and narrow in shape and are 5 to 30 acres in size.

These soils rarely occur together. Individual areas generally consist of Oquaga channery silt loam or Lordstown channery silt loam. The Oquaga soil is in the Catskill Mountains, and the Lordstown soil is on the plateau adjacent to the Catskill Mountains and in the Shawangunk Mountains.

Typically, the surface layer of the Oquaga soil is reddish brown channery silt loam about 7 inches thick. The friable, reddish brown subsoil is channery silt loam in the upper part and very channery loam in the lower part. Weak red shale bedrock is at a depth of about 32 inches.

Typically, the surface layer of the Lordstown soil is dark grayish brown channery silt loam about 8 inches thick. The friable, yellowish brown subsoil is channery silt loam in the upper part and channery loam in the lower part. Gray sandstone bedrock is at a depth of about 32 inches.

Included with these soils in mapping are narrow strips of Lackawanna, Swartswood, Valois, and Bath soils that are deeper than these Oquaga and Lordstown soils; small areas of Arnot soils and Rock outcrops that are on slope breaks; and some large areas of a soil in the Ulster Heights-Sundown section of the county that is similar to the Lordstown soil but has gravelly fine sandy loam in the subsoil. Also included are small areas of wetter Scriba, Morris, and Tuller soils along drainageways and in seeps.

These soils have free water above the bedrock for brief periods after very rainy periods, but it is generally below a depth of 6 feet. The root zone consists of 20 to 40 inches of moderately permeable soil over bedrock. Available water capacity is low to moderate. Runoff is rapid. In unlimed areas, reaction is extremely acid to medium acid throughout the Oquaga soil. The Lordstown

soil is very strongly acid or strongly acid in the surface layer and subsoil.

Most of the acreage of these soils is used for hay, pasture, and woodland. A few areas are cultivated. These soils have fair potential for farming and limited potential for community developments. Many areas have potential for recreational developments.

These soils are suited to crops and pasture. Slope, however, causes some difficulty in farming operations. Flat stone fragments hinder tillage. Good response can be expected from applications of lime and fertilizer. Prevention of erosion is a major concern, especially if slopes are long. Standard management practices, for example, contour farming, minimum tillage, use of cover crops, incorporating crop residue into the soil, and crop rotation, help to control erosion, improve tilth, and maintain the content of organic matter.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on these soils. Logging roads and skid trails need drainage dips or water bars to protect them from erosion.

The slope and bedrock at a depth of 20 to 40 inches are limitations for community developments. Many areas have esthetic qualities and panoramic views for homesites, but sites for sewage disposal can be very limiting. Blasting of bedrock is generally required for most urban developments. Erosion is a hazard during construction. A vegetative cover maintained on the site during construction helps to prevent erosion. Flat stone fragments interfere with most recreational uses. Capability subclass IIIe.

ORC—Oquaga-Arnot-Rock outcrop complex, sloping. This map unit consists of a moderately deep, well drained and excessively drained Oquaga soil; a shallow, somewhat excessively drained and moderately well drained Arnot soil; and small areas of exposed bedrock. The soils formed in reddish glacial till over sandstone, siltstone, and shale bedrock in the Catskill Mountains and their foothills. Relief is affected by bedrock. These soils are mainly on a series of low benches that have a stairstep appearance where the sandstone is dominant. Other areas that are underlain by red shale have smooth slopes. The Oquaga soil is mainly on the base of slopes and on benches where the till mantle is 20 to 40 inches thick. The Arnot soil is intermingled with outcrops on slope breaks and on the front part of benches. Slope ranges from 8 to 15 percent. Areas on foothills are generally broad and irregular in shape and are 15 to 300 acres in size. Areas on mountaintops and mountainsides are long and narrow in shape and are 15 to 150 acres in size.

This unit is made up of about 35 percent Oquaga channery silt loam, 25 percent Arnot channery silt loam, about 15 percent Rock outcrop, and 25 percent other soils. These soils and the Rock outcrop form such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Oquaga soil in a wooded area is dark reddish brown channery silt loam about 3 inches thick. The friable, reddish brown subsoil is channery silt loam in the upper part and very channery loam in the lower part. Weak red shale bedrock is at a depth of about 32 inches.

Typically, the surface layer of the Arnot soil in a wooded area is dark reddish brown channery silt loam about 3 inches thick. The subsoil is very friable, very channery silt loam. It is dark reddish brown in the upper part and reddish brown in the lower part. Weak red shale bedrock is at a depth of about 17 inches.

Included with these soils in mapping are narrow strips of Lackawanna, Wellsboro, Wurtsboro, and Valois soils that are deeper than these Oquaga and Arnot soils; Tunkhannock soils that are intermingled with the Rock outcrop along a few streams; many areas of soil that have slopes of 2 to 8 percent; and many areas of soil that are very bouldery. Also included are Tuller and Morris soils along drainageways and in slight depressions.

Free water is above the bedrock in the Oquaga soil for brief periods after very rainy periods, but it is generally below a depth of 6 feet. The root zone consists of the 20 to 40 inches of soil over the bedrock. Available water capacity is low to moderate.

The Arnot soil has free water above the bedrock for brief periods in spring and after heavy rains. The root zone consists of 10 to 20 inches of well aerated soil material over bedrock. A few roots penetrate fractures in the bedrock in some areas. Available water capacity is very low, and plants wilt quickly during dry periods.

Permeability is moderate in both soils. Runoff is medium to rapid. In unlimed areas, reaction is extremely acid to medium acid throughout both soils.

Most of the acreage of these soils and the Rock outcrop are used for woodland and for wildlife habitat. Some areas are used for permanent pasture and homesites. The unit has poor potential for farming and for community development, but it has potential for some types of recreational development.

Farm uses are affected by the moderately deep and shallow depth to bedrock, slope, and outcrops. The unit is not suited to cultivation with large farm machinery. The outcrops hinder fertilizing and mowing of pasture. Good fertilization and controlled grazing are important management practices.

Woodland productivity is moderately high on the Oquaga soil and poor on the Arnot soil. The outcrops interfere with machine planting of tree seedlings. Logging roads and skid trails need drainage dips or water bars to protect them from erosion.

The moderate and shallow depth to bedrock, slope, and outcrops are severe limitations for most urban uses of this unit. There are some esthetic homesite areas, but sites for sewage disposal can be very limiting. A vegetative cover maintained on the site during construction

helps to prevent erosion. Most areas have potential for paths and trails even though small stones and included Rock outcrops interfere with this use. Capability subclass VIs.

ORD—Oquaga-Arnot-Rock outcrop complex, moderately steep. This map unit consists of a moderately deep, well drained and excessively drained Oquaga soil; a shallow, somewhat excessively drained and moderately well drained Arnot soil; and small areas of exposed bedrock. These very bouldery soils formed in reddish glacial till over sandstone, siltstone, and shale bedrock in the Catskill Mountains and their foothills. Relief is affected by bedrock. These soils mainly are on a series of benches that have a stairstep appearance. The Oquaga soil is on benches and at the base of slopes where the till mantle is 20 to 40 inches thick. The Arnot soil is on narrow benches, slope breaks, and mountaintops where the till mantle is 10 to 20 inches thick. The risers between benches are generally made up of sandstone and siltstone bedrock. Slope ranges from 15 to 25 percent. Areas on mountainsides and foothills are broad or irregular in shape and are 40 to 300 acres in size. Those on mountaintops are long and narrow in shape and are 40 to 150 acres in size.

This unit is made up of about 35 percent Oquaga very bouldery silt loam, 30 percent Arnot very bouldery silt loam, 15 percent Rock outcrop, and 20 percent other soils. These soils and the Rock outcrop form such an intricate pattern that they are not shown separately on the soil map.

Typically, the subsoil of the Oquaga soil in a wooded area is directly under the forest litter and humus. The subsoil is very friable, strong brown very bouldery silt loam in the upper 5 inches and very friable and friable, yellowish red channery loam in the lower 20 inches. The substratum to a depth of about 32 inches is reddish brown very gravelly loam. Olive gray sandstone bedrock is at a depth of about 32 inches.

Typically, the subsoil of the Arnot soil in a wooded area is directly under the forest litter and humus. The subsoil is friable, brown very bouldery silt loam in the upper 3 inches and friable, reddish brown very channery silt loam in the lower 14 inches. Dusty red, fractured shale bedrock is at a depth of about 17 inches.

Included with this unit in mapping are Valois, Lackawanna, and Swartswood soils that are intermingled with the Oquaga soils at the base of slopes; small spots of Tuller and Morris soils that are in seeps; and areas of soils that have slopes of 25 to 35 percent and narrow benches that have slopes of 3 to 15 percent. Also included are a few areas of nonbouldery soils and narrow strips of Tunkhannock soils along streams in narrow valleys.

Free water is above the bedrock in the Oquaga soil for brief periods after very rainy periods, but it is generally below a depth of 6 feet. The root zone consists of the 20 to 40 inches of soil over the bedrock. Available water capacity is low to moderate.

The Arnot soil has free water above the bedrock for brief periods in spring and after heavy rain. The root zone consists of 10 to 20 inches of well aerated soil material over bedrock. A few roots penetrate fractures in the bedrock in some areas. Available water capacity is very low, and plants wilt quickly during dry periods.

Permeability is moderate in both soils. Runoff is very rapid. Boulders are mainly 2 to 6 feet across and 1 to 2 feet thick, but many are smaller and a few are larger. Distance between boulders is quite variable, but is generally 5 to 30 feet. Boulders cover about 0.1 to 3 percent of the surface of these soils. In unlimed areas, reaction is extremely acid to medium acid throughout both soils.

Most of the acreage of these soils and the Rock outcrop is used for woodland and for wildlife habitat to which it is suited. The unit has poor potential for farming and for urban uses, but it has potential for hiking.

The slope, outcrops, boulders, and moderate and shallow depth to bedrock are very severe limitations for farming. Fertilizing and mowing pasture are difficult.

Woodland productivity is moderately high on the Oquaga soil and poor on the Arnot soil. New plantations are difficult to establish. Logging roads and skid trails need drainage dips or water bars to protect them from erosion.

The moderately deep and shallow depth to bedrock, slope, outcrops, and boulders make construction for urban and recreational uses extremely difficult. Esthetic homesites are in some areas, but sites for sewage disposal can be very limiting. The hazard of erosion is high when vegetation is removed. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. Capability subclass VIIs.

Pa—Palms muck. This deep, nearly level to depressional, very poorly drained soil formed in 16 to 50 inches of well decomposed organic deposits over loamy mineral material. It is in basins that were formerly glacial lakes or ponds. Slope is generally less than 2 percent. Small areas generally are round, and larger areas are more irregular in shape. Areas are 5 to 100 acres in size.

Typically, the surface layer is very dark brown muck about 7 inches thick. The subsurface layer consists of slightly sticky and slightly plastic, very dark brown muck 37 inches thick. The mineral substratum to a depth of about 56 inches is dark gray sandy clay loam.

Included with this soil in mapping are small areas of Carlisle soils that are near the center of large basins; small areas of Palms Muck, bedrock variant soils, that are near shallow soils; and areas of Lyons, Canandaigua, Menlo, Atherton, Wayland, Madalin, and Lamson soils that formed in mineral material and are around the margins of areas and on very slight rises. Also included is an area of soil on the Wallkill Correctional Facility Farm that

has white to very pale brown marl at a depth of 8 to 24 inches; small areas of soil near Ulster Heights that have a mineral cap over the muck; and in the western part of the county, areas of a soil that is similar to the Palms Muck soils but has a higher content of fibers throughout.

This soil has a seasonal high water table and is ponded for long periods in undrained areas late in fall, in winter, and in spring. Roots are strongly influenced by the depth to the water table. Few roots penetrate below a depth of 12 inches. Available water capacity of this zone is moderate. Permeability is moderately rapid or rapid in the organic layers and is moderate or moderately slow in the loamy substratum. Runoff is very slow, and this soil receives runoff from adjacent areas. Reaction is very strongly acid to neutral throughout the organic deposit.

Most of the acreage of this soil is in marsh vegetation of grasses, reeds, sedges, and water-tolerant tree species. This soil has poor potential for farming and for community developments. Undrained areas have good potential for wetland wildlife habitat.

This soil must be drained if it is used for crops and pasture. If drained, it is very productive for vegetables and field crops. Drainage outlets are difficult to establish in many areas. In some areas, blasting of bedrock is required in the drainage outlet. Pumping over a dike is often the ultimate solution to maintaining an outlet. Open ditches and subsurface drains are both needed in most areas. Subsidence or shrinkage occurs after draining. Controlled drainage, whereby the water table can be raised or lowered, reduces shrinkage. Windbreaks or irrigation should be used to control soil blowing. Irrigation is also needed in drained areas during extended dry periods. Use of cover crops, good fertilization, minimum tillage, and tilling and harvesting at the proper moisture condition are important in management.

Woodland productivity is moderate. Species that are tolerant of wetness need to be selected for reforestation. Machine planting of tree seedlings generally is not practical in undrained areas.

This soil generally is not used for community and recreational developments because of prolonged wetness, low strength of the soil, frost damage, and poor trafficability. Mosquitoes are commonly a concern on this soil when surrounding soils are developed. Sloughing is generally a hazard in excavations in this soil. In some areas, this soil is a suitable site for dugout ponds or wildlife marshes. Capability subclass IVw.

Pb—Palms muck, bedrock Variant. This nearly level, very poorly drained soil formed in well decomposed organic deposits over loamy mineral material and bedrock. It is in small, closed depressions. Sandstone, siltstone, slate, or conglomerate bedrock is at a depth of 20 to 50 inches and restricts internal drainage. Slope is generally less than 2 percent. Most areas are long and narrow or oval in shape and are 5 to 20 acres in size.

Typically, the surface layer is black muck about 8 inches thick. The subsurface layer to a depth of about 30 inches is nonsticky and slightly plastic, black and olive gray muck. The substratum to a depth of about 38 inches is dark gray, very gravelly loam over gray sandstone bedrock.

Included with this soil in mapping are small areas of Palms and Carlisle soils that are deeper than this soil and are mainly in the eastern and south-central sections of the county where bedrock is strongly folded and tilted. Also included are some areas of Lyons, Canandaigua, and Menlo soils that formed in mineral material.

This soil has a seasonal high water table and is ponded for long periods late in fall, in winter, and in spring. Roots are strongly influenced by the depth to the water table. Few roots penetrate below a depth of 12 inches. Available water capacity of this zone is moderate. Permeability is moderately rapid to rapid in the organic layers and is moderate in the mineral substratum over the bedrock. Runoff is very slow, and this soil receives runoff from adjacent areas. Reaction increases with depth from very strongly acid to neutral in the surface layer to slightly acid or neutral above the bedrock.

Most of the acreage of this soil is in marsh vegetation of grasses, reeds, and sedges, and water-tolerant trees. This soil has poor potential for farming and for community developments. It is best suited to woodland and to wetland wildlife habitat.

Drainage of this soil for farming generally is not feasible because of subsidence and bedrock at a depth of 20 to 50 inches. Blasting of bedrock is necessary for most drainage outlets. Drained areas need control of soil blowing and management of water to reduce the rate of subsidence and oxidation. Areas that can be drained are suited to crops and pasture.

Woodland productivity is moderate. Species that are tolerant of wetness are needed for reforestation. Machine planting of tree seedlings generally is not practical.

This soil is not used for community and recreational developments because of prolonged wetness, frost damage, poor trafficability, and bedrock at a depth of 20 to 50 inches. Mosquitoes are commonly a concern when this soil and surrounding soils are developed. In its natural state, this soil is suited to wetland wildlife habitat. Capability subclass VIIw.

PlB—Plainfield loamy sand, 0 to 8 percent slopes. This deep, excessively drained, nearly level and gently sloping soil formed in water-laid deposits of dominantly medium and coarse sand. It is on deltas and outwash plains. Most areas are irregular in shape and are 40 to 150 acres in size.

Typically, the surface layer is dark brown loamy sand about 9 inches thick. The subsoil extends to a depth of about 32 inches. It is friable, brown loamy sand and loamy coarse sand. The substratum to a depth of about

65 inches is brown coarse sand and is 5 percent fine gravel.

Included with this soil in mapping are areas of Pompton and Walpole soils that are wetter than this Plainfield soil and are in slight depressions; some areas of Riverhead soils that intermingled with this soil, but not extensively; and some areas, mainly on the plain north-northwest of Kerhonkson, of a soil that is similar to the Plainfield soil but has medium textured and moderately fine textured layers in the substratum below a depth of 5 feet. These included areas and other small areas near wetter associated soils have a seasonal high water table below a depth of 3 1/2 feet. Also included are a few long, narrow areas of a soil that is similar to the Plainfield soil on old glacial-stream terraces but is slightly acid or neutral throughout. This included soil is subject to flooding during periods of above average rainfall.

This soil is one of the best drained soils in the county. It dries quickly after rain, causing shallow-rooted crops to wilt after a few rainless days. Roots are not restricted, but most roots are in the upper 3 feet of the soil. Available water capacity is very low to low. Permeability is rapid throughout the soil. Runoff is slow. In unlimed areas, reaction is very strongly acid to medium acid throughout.

Most of the acreage of this soil is used for cultivated crops, hay, pasture, or homesites. This soil has fair potential for farming and good potential for most urban and recreational developments.

This soil is suited to crops, hay, and pasture. It generally is not used for commercial orchards and vineyards. Deep-rooted crops are especially suitable. Crops can be planted earlier in spring than on most other soils in the county. Irrigation is needed. This soil does not have high natural productivity, but it responds well to good management. Because applied nutrients are rapidly leached from this soil, response is generally better to smaller but more frequent or more timely applications than to one large application. Incorporating crop residue into the soil, use of cover crops, tillage at the proper moisture condition, and crop rotation help to improve tilth and maintain the content of organic matter.

Woodland productivity is moderate. Machine planting of tree seedlings is practical on this soil. Seedling mortality is a hazard during dry years.

This soil is one of the best soils in the county for many urban uses. Soil blowing and water erosion are hazards. A vegetative cover maintained on the site during construction helps to prevent erosion. Lawn seeding needs to be done early in spring; seeding during the drier part of the growing season is generally a failure. If lawns are seeded during dry periods, the seedlings need to be mulched and watered. The included areas where the water table fluctuates to within 3 1/2 feet of the surface are poorly suited to buildings with basements. In areas where the soil is used for disposal of septic tank effluent, rapid permeability throughout the soil can cause contamination of ground water. Sloughing is a hazard in excavations in this soil. The sandy surface layer limits most recreational uses. This soil is a good source of sand. Capability subclass IIIs.

PlC—Plainfield loamy sand, 8 to 15 percent slopes. This deep, excessively drained, sloping soil formed in water-laid deposits of dominantly medium and coarse sand. It is on deltas and outwash plains. Areas are mainly long and narrow in shape and are 5 to 100 acres in size.

Typically, the surface layer is dark brown loamy sand about 9 inches thick. The subsoil extends to a depth of about 32 inches. It is friable, brown loamy sand and loamy coarse sand. The substratum to a depth of about 65 inches is brown coarse sand and is about 5 percent fine gravel.

Included with this soil in mapping are a few areas of a soil that is similar to the Plainfield soil but has medium textured and moderately fine textured layers in the substratum below a depth of 40 inches. In some places, these layers cause hillside seep spots. A few areas of Riverhead soils are intermingled with this soil, but not extensively. Also included are a few areas of gravelly Hoosic soils and small spots of an eroded soil.

This soil is one of the best drained soils in the county. It dries quickly after rain, causing shallow-rooted crops to wilt after a few rainless days. Roots are not restricted, but most roots are in the upper 3 feet of the soil. Available water capacity is very low to low. Permeability is rapid throughout the soil. Runoff is medium. In unlimed areas, reaction is very strongly acid to medium acid throughout the soil.

Most of the acreage of this soil is used for hay, pasture, or woodland. This soil has poor potential for farming and fair potential for many urban uses.

This soil is poorly suited to cultivated crops because of droughtiness and susceptibility to erosion. It can be cropped successfully, but cropping systems need to include a high proportion of long-term hay or pasture. This soil is most productive for deep-rooted crops, for example, alfalfa. Conservation of moisture is very important. Contour farming is needed. Because applied nutrients are rapidly leached from this soil, response is generally better to smaller but more frequent or more timely applications than to one large application. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation, help to improve tilth and maintain the content of organic matter.

Woodland productivity is moderate. Machine planting of tree seedlings is practical on this soil. Seedling mortality is a hazard during dry years.

Even though the slope limits many urban uses of this soil, most areas are good homesites. The hazards of soil blowing and water erosion are severe during construc-

tion. A vegetative cover maintained on the site during construction helps to prevent erosion. Sloughing is a hazard in excavations in this soil. In areas where this soil is used for disposal of septic tank effluent, rapid permeability throughout the soil can cause contamination of ground water. Lawn seedings made during the drier part of the growing season are generally a failure. They need to be made early in spring or, if made during dry periods, they need to be mulched and watered. The slope and the sandy surface layer are limitations for most recreational uses. This soil is a good source of sand. Capability subclass IVs.

PmD—Plainfield-Riverhead complex, moderately steep. This map unit consists of deep soils that formed in waterlaid sandy deposits on the faces and dissected areas of deltas and outwash plains. The excessively drained Plainfield soils generally are on the upper one-half to two-thirds of the slope and the well drained Riverhead soils are on the lower part. Slope ranges from 15 to 25 percent and is in one direction. Areas are mainly long and narrow in shape and are 5 to 50 acres in size.

This unit is made up of about 50 percent Plainfield loamy fine sand and loamy sand, 35 percent Riverhead fine sandy loam and loam, and 15 percent other soils. Plainfield and Riverhead soils occur in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Plainfield soil is brown loamy sand about 6 inches thick. The subsoil extends to a depth of about 28 inches. It is very friable, strong brown sand and loamy sand. The substratum to a depth of about 65 inches is yellowish brown sand.

Typically, the surface layer of the Riverhead soil is brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of about 24 inches. It is very friable, dark yellowish brown and strong brown sandy loam and fine sandy loam. The substratum to a depth of about 62 inches is yellowish brown loamy sand and sand.

Included with this unit in mapping are narrow strips of soils that are similar to the Hudson and Schoharie soils but have less clay in the subsoil. These soils are on the lower part of slopes, and the clayey layers cause lateral seepage of water to the surface. Many of these hillside seep spots are shown on the soil map by a wet spot or spring spot symbol. Also included are a few narrow strips that have bedrock at a depth of 40 to 60 inches and small areas of Hoosic and Valois soils.

Roots are not restricted in these soils, but most roots are in the upper 3 feet of the soil. Available water capacity is very low to low in the Plainfield soils and is moderate in the Riverhead soils. Wilting of shallow-rooted crops is common on the rapidly permeable Plainfield soils after a few rainless days. Permeability of the Riverhead soils is moderately rapid in the surface layer and subsoil and is very rapid in the substratum. Runoff is rapid. In unlimited areas, reaction of the Plainfield soils is very strongly acid to medium acid in the surface layer and subsoil. Reaction of the Riverhead soils is very strongly acid or strongly acid in the surface layer and subsoil.

Most of the acreage of this unit is used for woodland and for wildlife habitat. A few areas are used for pasture. These soils have poor potential for farming. Slope affects farm and nonfarm uses of these soils.

This unit is poorly suited to cultivated crops. It can be cropped successfully, but cropping systems need to include a high proportion of long-term hay or pasture. These soils are most productive of deep-rooted crops and are well suited to early pasture. Use of tillage equipment is very difficult, especially for large machines, because of slope. Lack of moisture is very critical in the Plainfield soils that are on the upper part of slopes. Erosion is a severe hazard if the soils are cultivated and not protected. Minimum tillage, contour farming, use of cover crops, and incorporating crop residue into the soil are important in management. Because applied lime and fertilizer are leached from this unit at a moderate to rapid rate, response is generally better to smaller but more frequent or more timely applications than to one large application.

Woodland productivity is moderate on the Plainfield soils and is moderately high on the Riverhead soils. The slope presents some difficulty in machine planting of tree seedlings. Seedling mortality is a hazard during dry years.

This unit is limited for most urban and recreational uses because of the slope. The sandy surface layer of the Plainfield soils also limits most recreational uses. The hazards of soil blowing and water erosion are severe during construction. A vegetative cover should be maintained on the site. Trench absorption fields are difficult to lay out and construct. Controlling the downhill flow of effluent is a serious concern. Rapid and very rapid permeability in the substratum can result in contamination of ground water by septic tank effluent. Sloughing is a hazard in excavations. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. This unit is a good source of sand. Capability subclass IVe.

PmF—Plainfield-Riverhead complex, very steep. This map unit consists of deep soils that formed in water-laid sandy deposits on the faces and dissected areas of deltas and outwash plains. The excessively drained Plainfield soils generally are on the upper one-half to two-thirds of the slope, and the well drained Riverhead soils are on the lower part. Most areas are dissected by many intermittent waterways. Slope ranges from 35 to 60 percent. Areas are long and narrow in shape and are 10 to 40 acres in size.

This unit is made up of about 50 percent Plainfield loamy fine sand and loamy sand, 30 percent Riverhead fine sandy loam and loam, and 20 percent other soils.

Plainfield and Riverhead soils are in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Plainfield soil is brown loamy sand about 4 inches thick. The subsoil extends to a depth of about 24 inches. It is very friable, strong brown sand and loamy sand. The substratum to a depth of about 65 inches is yellowish brown sand.

Typically, the surface layer of the Riverhead soil is brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of about 22 inches. It is very friable, dark yellowish brown and strong brown sandy loam and fine sandy loam. The substratum to a depth of about 62 inches is yellowish brown loamy sand and sand.

Included with this unit in mapping are narrow strips of soils that are similar to the Hudson and Schoharie soils but have less clay in the subsoil. These soils are on the lower part of slopes, and the clayey layer causes lateral seepage of water to the surface. Many of these hillside seep spots are shown on the soil map by a wet spot or spring spot symbol. Also included are a few narrow strips of soils that have bedrock at a depth of 20 to 60 inches and small areas of Hoosic and Valois soils. Most of the included soils have slopes of 25 to 35 percent.

Roots are not restricted in these soils, but most roots are in the upper 3 feet of the soil. Available water capacity is very low to low in the Plainfield soils and is moderate in the Riverhead soils. Wilting of shallow-rooted crops is common on the rapidly permeable Plainfield soils after a few rainless days. Permeability in the Riverhead soils is moderately rapid in the surface layer and subsoil and is very rapid in the substratum. Runoff is very rapid. In unlimed areas, reaction of the Plainfield soils is very strongly acid to medium acid in the surface layer and subsoil. Reaction of the Riverhead soils is very strongly acid or strongly acid in the surface layer and subsoil.

Slope dominates the capabilities of this unit. Most areas are used for woodland and for wildlife habitat. The soils have poor potential for farming and for urban development. In undisturbed areas, these soils need to be kept in their natural state. Some areas are scenic spots and have potential for recreational developments.

These soils are not suited to crops because they are very steep and droughty. The use of farm machinery is impractical and dangerous.

Woodland productivity is moderate on the Plainfield soils and is moderately high on the Riverhead soils. The slope presents a severe limitation to equipment use.

The very steep slope causes difficulty in construction for urban development. The hazard of erosion is high when vegetation is removed. Septic tank absorption fields are difficult to construct because of the very steep slopes. Sloughing is a hazard in excavations. The included areas of soils that are similar to Hudson and Schoharie are subject to landslides. Some areas in this unit are scenic spots and have potential for recreational developments. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. This unit is a good source of sand. Capability subclass VIIe.

PrC—Plainfield-Rock outcrop complex, rolling. This map unit consists of the deep, excessively drained Plainfield soil and Rock outcrop. It is on deltas and outwash plains. The Plainfield soil formed in water-laid deposits of dominantly medium and coarse sand. Areas of this unit consist mainly of the Plainfield soil between a series of folded, shale, siltstone, sandstone, and limestone bedrock ridges. Rock outcrop is mainly on the ridges that are generally oriented in a northeast-southwest direction. Relief is very irregular. Slopes are short and generally complex and range from 5 to 16 percent. Areas vary in size and shape, but some are as much as 1,000 acres in size.

This unit is made up of about 65 percent Plainfield loamy sand, 15 percent Rock outcrop, and 20 percent soils of minor extent. The Plainfield soil and Rock outcrop occur in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Plainfield soil is dark brown loamy sand about 9 inches thick. The subsoil extends to a depth of about 32 inches. It is friable, brown loamy sand and loamy coarse sand. The substratum to a depth of about 65 inches is brown coarse sand that is about 5 percent fine gravel.

Included with this unit in mapping are small areas of Pompton and Walpole soils that are wetter than this Plainfield soil and are in depressions; narrow strips of Stockbridge and Bath soils; small areas of soils that have a surface layer of loamy fine sand and many areas of soils that are similar to the Plainfield soils but have bedrock at a depth of 20 to 40 inches. Most areas of included soils have slopes of 2 to 5 percent and 16 to 25 percent. Also included along U.S. Route 9W near Esopus are deep, well drained Riverhead soils on the Plainfield position in the unit.

This Plainfield soil is one of the best drained soils in the county. It dries quickly after rain, causing shallow-rooted crops to wilt after a few rainless days. Roots are not restricted, but most roots are in the upper 3 feet of the soil. Available water capacity is very low to low. Permeability is rapid throughout this soil. Runoff is medium. In unlimed areas, reaction is very strongly acid to medium acid throughout.

This unit is used mainly for permanent pasture, for woodland, and for urban and recreational development. It has poor potential for farming, but it has potential for some urban uses even though the bedrock outcrops severely limit many of these uses.

Farm uses are affected by rock outcrops and droughtiness. Most areas of this unit are not suited to cultivation with large machinery. A few small areas are used for orchards and vineyards, but fruit trees are widely spaced

and open areas are around the outcrops. The outcrops hinder fertilizing and mowing of pastures. Because applied nutrients are rapidly leached, response is generally better to smaller but more frequent or more timely applicaions than to one large application.

Woodland productivity is moderate on the Plainfield soil. The outcrops interfere with machine planting of tree seedlings. Seedling mortality is a hazard during dry years.

Many areas of this unit are used for housing. Houses are generally widely spaced and have outcrops in the lawn areas. Some areas are esthetic homesites, but Rock outcrops seriously limit excavations for basements, sewage disposal systems, and underground utilities. Excavations can easily be made in the Plainfield soils, but a soil investigation is needed before planning an excavation. Sloughing is a hazard in excavations in the Plainfield soil. In areas where this soil is used for disposal of septic tank effluent, rapid permeability throughout the soil can cause contamination of ground water. Lawn seedings made during the drier part of the growing season are generally a failure. Seedings need to be made early in spring or, if made during dry periods, the seedlings need to be mulched and watered. The sandy surface layer of the Plainfield soil, the outcrops, and slope are limitations for most recreational uses. Capability subclass VIIs.

Pt—Pompton fine sandy loam. This deep, nearly level, moderately well drained soil formed in water-sorted sandy sediment that was deposited as streams entered glacial lakes. It is in broad, slight depressions on outwash plains and deltas and on foot slopes of delta faces. Slope ranges from 0 to 3 percent. Areas are roughly oblong in shape and are 10 to 70 acres in size.

Typically, the surface layer is dark brown fine sandy loam 9 inches thick. The subsoil extends to a depth of 29 inches. It is very friable sandy loam that is dark brown in the upper part and mottled, yellowish brown in the lower part. The substratum to a depth of about 50 inches is mottled, gray and light brownish gray loamy sand and loamy fine sand. Stratified brown, yellowish brown, and olive gray loamy sand and sandy loam are in the substratum to a depth of about 61 inches.

Included with this soil in mapping are small areas of Riverhead and Plainfield soils that are on slight rises and make up as much as 15 percent of some areas and small areas of Walpole and Lamson soils that are wetter than this Pompton soil and are along drainageways or in small depressions. Also included are areas of a soil that is similar to the Pompton soil but has medium textured and moderately fine textured layers in the substratum below a depth of 40 inches; these layers are slightly acid to strongly acid.

This soil has a seasonal high water table at a depth of 18 to 24 inches in spring and in other excessively wet periods. Depth of rooting is related to the height of the water table and is mainly 18 to 24 inches. Available water capacity in the root zone is low to moderate. Permeability is moderate or moderately rapid in the surface layer and subsoil and is rapid or very rapid in the substratum. Surface runoff is slow. In unlimed areas, reaction is very strongly acid or strongly acid throughout the soil.

Most of the acreage of this soil is used for crops, pasture, or woodland. This soil has good potential for farming. Seasonal wetness limits urban and some recreational uses of this soil.

This soil is suited to cultivated crops, special crops, hay, and pasture. Seasonal wetness delays planting in some years. If this soil is cropped intensively, random drainage of the included wetter spots is essential. Maintaining tilth and a high level of fertility is also a main concern in management. Minimum tillage, incorporating crop residue into the soil, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management. Applied lime and fertilizer are leached from this soil at a moderately rapid rate; consequently, response is generally better to smaller but more frequent or timely applications than to one large application. Soil compaction is a concern in areas where this soil is used for vegetables and harvesting is done during wet periods. Use of lighter machinery with wider tire treads or use of specially designed machinery helps prevent soil compaction.

Fruit crops are suited to this soil. Soil compaction is a concern because spraying operations are often performed during wet periods with heavy equipment. Artificial drainage, maintaining a good sod cover, and use of lighter machinery with wider tire treads or use of specially designed machinery help to prevent soil compaction.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

The seasonal high water table is a limitation for many urban uses. Many dwellings on this soil have wet basements in spring and in other excessively wet periods. This soil is better suited to dwellings without basements than to those with basements. Foundation drains and protective coatings on the exterior walls of basements should be used. In areas where this soil is used for disposal of septic tank effluent, rapid permeability in the substratum can cause contamination of ground water. Sloughing is a hazard in excavations in this soil. This soil has potential for such recreational uses as picnic areas and paths and trails. Capability subclass IIw.

Ra—Raynham silt loam. This deep, nearly level, somewhat poorly drained soil formed in water-laid deposits of silt and very fine sand. It is on stream terraces and lake plains and in upland basins formerly occupied by glacial lakes. Slope ranges from 0 to 3 percent. Areas are broad or long and narrow in shape and are 5 to 70 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is leached, mottled, grayish brown silt loam 4 inches thick. The subsoil extends to a depth of about 37 inches. The upper 10 inches is friable, mottled, grayish brown silt loam; the next 10 inches is firm, mottled, pale olive silt loam; and the lower 5 inches is firm, mottled, reddish brown silt loam. The substratum to a depth of about 56 inches is mottled, reddish brown very fine sandy loam and silt loam.

Included with this soil in mapping on lake plains are areas that have thin layers of silty clay loam and silty clay in the substratum; small areas of moderately well drained Williamson and Scio soils that are at a slightly higher elevation; and narrow strips of Canandaigua soils that are wetter than this Raynham and are in depressions and along drainageways. Also included in the upland basins are areas of a soil that is similar to the Raynham but has a fragipan below a depth of 12 to 24 inches.

This soil receives runoff from adjacent soils. It is mainly on lake plains and in upland basins that are not subject to flooding. Some areas on low stream terraces are subject to flooding during periods of higher than normal rainfall. This soil has a seasonal high water table that rises to a depth of 6 to 18 inches below the surface in spring, early in summer, and in other excessively wet periods. A few areas are ponded for short periods. Roots are mainly confined to a depth of 15 to 24 inches, depending on the depth to the seasonal high water table and on the degree of drainage. Available water capacity is moderate. Permeability is moderate in the surface layer, is moderate or moderately slow in the subsoil, and is slow in the substratum. Runoff is slow. In unlimed areas, reaction is strongly acid to slightly acid in the surface layer and subsoil.

Most of the acreage of this soil is used for crops, hay, pasture, and woodland. This soil has fair potential for farming, but it has limited potential for urban developments because of wetness.

Drained areas of this soil are suited to cultivated crops, hay, and pasture. Wetness is the main concern in management. Undrained areas can be used for hay and pasture, but keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. Planting is delayed and the choice of crops is limited in these undrained areas. A combination of surface and subsurface drains are needed in many areas. Drainage outlets may be difficult to establish. Keeping the soil from crusting after rains and maintaining tilth and a high level of fertility and organic matter are also very important. Minimum tillage, incorporating crop residue into the soil, crop rotation, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management.

Drained areas of this soil have fair potential for fruit crops, and only a very small acreage is used for these crops. Rootstalk that can tolerate wetness need to be used when establishing new orchards and vineyards. Soil compaction is a continuous concern because spraying operations are commonly performed during wet periods. Artificial drainage, maintaining a good sod cover, and use of lighter machinery with wider tire treads or use of specially designed machinery help prevent soil compaction.

Undrained areas of this soil are suited to woodland and to wildlife habitat. Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil. Wetness limits the suitability of this soil for some species.

The seasonal high water table, slow permeability in the substratum, and the flooding hazard in a few areas of low stream terraces are limitations for most urban and recreational developments. Many dwellings on this soil have wet basements. Foundation drains and protective coatings on the exterior walls of basements help prevent wet basements. Specially designed septic tank absorption fields are needed. Sloughing is a hazard in excavations in this soil. Roads need artificial drainage and a thick subbase. Capability subclass IIIw.

Re—Red Hook gravelly silt loam. This deep, nearly level, somewhat poorly drained soil formed in glacial outwash. It is on the lower parts of glacial outwash terraces, stream terraces, and water-sorted parts of moraines. Slopes are 0 to 3 percent. Most areas are long and narrow in shape and are 5 to 10 acres in size.

Typically, the surface layer is brown gravelly silt loam about 8 inches thick. The subsoil extends to a depth of about 30 inches and is friable, mottled, gravelly silt loam and gravelly loam. It is pale olive in the upper part and light olive gray in the lower part. The substratum is olive gray very gravelly loamy sand to a depth of about 37 inches and mottled, olive gray very gravelly sandy loam to a depth of 50 inches.

Included with this soil in mapping are small areas of Atherton and Canandaigua soils that are wetter than this Red Hook soil and are in depressions and along drainageways; a few areas of moderately well drained Castile soils that are on slight rises; and some small areas of soils that have a surface layer of gravelly loam. Also included are a few small areas of Raynham, Volusia, and Scriba soils.

This soil has a water table that rises to a depth of 6 to 18 inches below the surface in winter, in spring, and in other excessively wet periods. Roots are strongly influenced by the water table. In spring, they are confined mainly to the upper 15 to 20 inches of the soil. A few roots penetrate to a greater depth as the water table recedes. Available water capacity is low in the root zone, but the water table fluctuates and plants seldom show moisture stress during periods of normal rainfall. Permeability is moderate in the surface layer and subsoil and is moderate or moderately slow in the substratum. Runoff

and underground seepage commonly collect on this soil. In unlimed areas, reaction typically increases as depth increases from strongly acid to slightly acid in the surface layer and upper part of the subsoil to medium acid to neutral in the lower part of the subsoil.

Most of the acreage of this soil is used for crops, pasture, and woodland. This soil has fair potential for farming, but it has limited potential for many urban uses because of wetness.

Drained areas of this soil are suited to cultivated crops, hay, and pasture. Wetness is the main concern in management in undrained areas. Planting is delayed, and the choice of crops is limited. Undrained areas can be used for hay and pasture, but keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. A combination of surface and subsurface drains is needed in many areas. Drainage outlets are difficult to locate in places. Standard management practices, for example, minimum tillage, use of cover crops, good fertilization, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation, help to improve tilth and maintain the content of organic matter.

Drained areas of this soil have fair potential for fruit crops. Rootstalk that can tolerate wetness are needed when establishing new orchards and vineyards. Soil compaction is a continuous concern because spraying operations are commonly performed during wet periods. Artificial drainage, maintaining a good sod cover, and use of lighter machinery with wider tire treads or use of specially designed machinery help prevent soil compaction.

Undrained areas of this soil are suited to woodland and to wildlife habitat. Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil. Wetness limits the suitability of this soil for some species.

The seasonal high water table limits most urban and recreational uses. This soil is better suited to dwellings without basements than to those with basements. Foundation drains and protective coatings on the exterior walls of basements help prevent wet basements. Specially designed septic tank absorption fields are needed. Capability subclass IIIw.

RhA—Rhinebeck silt loam, 0 to 3 percent slopes. This deep, somewhat poorly drained, nearly level soil formed in lake-laid deposits of clay and silt. It is mainly on broad glacial lake plains and other landforms that are mantled with lake sediment. Areas are long and narrow to irregular in shape. They are generally large; some areas are more than 200 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is leached, mottled, pale brown silty clay loam about 2 inches thick. The subsoil extends to a depth of about 35 inches. The upper 6 inches is firm, mottled, light brownish gray silty clay loam; the next 12 inches is very firm, mottled, light brownish gray silty clay; and the lower 7 inches is firm, mottled, dark yellowish brown silty clay. The substratum to a depth of about 50 inches is mottled, dark yellowish brown, varved silty clay and silt loam.

Included with this soil in mapping are areas of moderately well drained Hudson soils that are on low knolls, narrow strips of Madalin and Canandaigua soils that are wetter than this Rhinebeck soil and are in depressions and along drainageways, and some areas of Churchville and Cayuga soils that are in lake-laid deposits 20 to 40 inches thick over glacial till. Also included are areas of Raynham soils that have less clay in the subsoil than this Rhinebeck soil.

This soil has a perched seasonal high water table at a depth of 6 to 18 inches in winter, in spring, and in other excessively wet periods. Roots are mainly confined to a depth of 15 to 24 inches, depending on the depth to the seasonal high water table.

Available water capacity of this zone is moderate. Permeability is moderately slow in the surface layer and is slow in the subsoil and substratum. This soil becomes puddled and forms clods if cultivated when wet. Runoff is slow. Reaction is medium acid to neutral in the surface layer and subsoil.

Most of the acreage of this soil is used for hay, pasture, and woodland. Some areas are used for intertilled crops, and others are idle. This soil has fair potential for farming, but it has limited potential for urban and recreational development.

Drained areas of this soil are suited to cultivated crops, hay and pasture. Undrained areas are suited to hay and pasture, but keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. Planting is delayed, and the choice of crops limited in these undrained areas. Wetness, slow permeability, and the high content of clay and silt in the subsoil limit the suitability of this soil for special crops and fruit crops. Surface drainage is important in management of this soil, but establishing adequate drainage outlets is a limitation in places. Subsurface drains must be closely spaced to give uniform drainage. Maintenance of good tilth is difficult in intensively cultivated areas. This soil needs to be cultivated at the proper moisture condition because it is sticky when wet and fairly hard when dry. Hard clods and a crusty surface form if the soil is cultivated when wet. Planting when the soil is very dry generally results in poor seed germination. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, crop rotation, good fertilization, and harvesting at the proper moisture condition, help to improve tilth and maintain the content of organic matter.

Undrained areas of this soil are suited to woodland and to wildlife habitat. Woodland productivity is moderately high. Machine planting of tree seedlings is practical

on this soil. Wetness limits the suitability of this soil for some species.

Only a small acreage of this soil is used for urban and recreational developments because of the perched seasonal high water table, low strength, and slow permeability in the subsoil and substratum. Many dwellings have wet basements. Foundation drains and protective coatings on the exterior walls of basements help prevent this wetness. Spread footings are needed because of low strength of the soil. Specially designed septic tank absorption fields are needed. Roads need artificial drainage and a thick subbase. Capability subclass IIIw.

RhB—Rhinebeck silt loam, 3 to 8 percent slopes. This deep, somewhat poorly drained, gently sloping soil formed in lake-laid deposits of clay and silt. It is mainly on very broad, low ridges on glacial lake plains and other landforms that are mantled with lake sediment. Some areas along waterways are gently sloping. Slopes are smooth. Areas are irregular in shape and are 5 to 160 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is leached, mottled, pale brown silty clay loam about 2 inches thick. The subsoil extends to a depth of about 35 inches. The upper 6 inches is firm, mottled, light brownish gray silty clay loam; the next 12 inches is firm, mottled, light brownish gray silty clay; and the lower 7 inches is firm, mottled, dark yellowish brown silty clay. The substratum to a depth of about 50 inches is mottled, dark yellowish brown, varved silty clay and silt loam.

Included with this soil in mapping are small areas of moderately well drained Hudson soils that are on the tops of convex knolls; long, narrow strips of Madalin and Canandaigua soils that are wetter than this Rhinebeck soil and are in depressions and along waterways; and areas of Churchville and Cayuga soils that are in areas where the lacustrine deposits are 20 to 40 inches thick over glacial till. Also included are some areas of silty Raynham and Williamson soils.

This soil has a perched seasonal high water table at a depth of 6 to 18 inches in winter, in spring, and in other excessively wet periods. Roots are mainly confined between 15 and 24 inches, depending on the depth to the seasonal high water table. Available water capacity of this zone is moderate. Permeability is moderately slow in the surface layer and is slow in the subsoil and substratum. This soil becomes puddled and forms clods if it is cultivated when wet. Runoff is medium. Reaction is medium acid to neutral in the surface layer and subsoil.

Most of the acreage of this soil is used for crops, hay, pasture, and woodland. Some areas are idle. This soil has fair potential for farming, but it has limited potential for urban and recreational developments.

Drained areas of this soil are suited to cultivated crops, hay, and pasture. Wetness, slow permeability, and the high content of clay and silt in the subsoil limit the suitability of this soil for crops that are planted early in spring and for special crops and fruit crops. Controlling excess water is a major management need. Undrained areas can be used for hay and pasture, but keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. Surface drains and diversion terraces generally are effective in removing excess surface water. Subsurface drains must be closely spaced in this slowly permeable soil for adequate drainage. Controlling erosion and maintaining good tilth are difficult in intensively cultivated areas. This soil needs to be cultivated at the proper moisture condition because it is sticky when wet and fairly hard when dry. Hard clods and a crusty surface form if this soil is cultivated when wet. Planting when the soil is very dry generally results in poor seed germination. Standard management practices, for example, minimum tillage, contour farming, use of cover crops, incorporating crop residue into the soil, crop rotation, good fertilization, and planting and harvesting at the proper moisture condition, help to improve tilth and maintain the content of organic matter.

Undrained areas of this soil are suited to woodland and to wildlife habitat. Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil. Wetness limits the suitability of this soil for some species.

Only a small acreage of this soil is used for urban and recreational developments because of the perched seasonal high water table, low strength, and slow permeability in the subsoil and substratum. Many dwellings have wet basements. Foundation drains and protective coatings on exterior walls of basements help prevent this wetness. Spread footings are needed because of low strength of the soil. Specially designed septic tank absorption fields are needed. Roads need artificial drainage and a thick subbase. Erosion is a hazard during construction. Capability subclass IIIw.

RvA—Riverhead fine sandy loam, 0 to 3 percent slopes. This deep, well drained, nearly level soil formed mainly in water-laid deltaic deposits from streams that entered glacial lakes. It is on the top of deltas, and some areas extend more than 1 mile. Most areas are irregular in shape and are 25 to 400 acres in size.

Typically, the surface layer is dark brown fine sandy loam about 8 inches thick. The subsoil is very friable, dark yellowish brown and strong brown sandy loam that extends to a depth of about 26 inches. The substratum to a depth of about 62 inches is dark yellowish brown and brown loamy sand and sand.

Included with this soil in mapping are a few areas of Pompton and Walpole soils that are wetter than this Riverhead soil and are in depressions; a coarser textured Plainfield soils that are intermingled with this soil, but not extensively; and small areas of soils that have a surface layer of loam and sandy loam. Also included are areas of a soil that is similar to the Riverhead soil but has

medium textured and moderately fine textured layers in the substratum below a depth of 3-1/2 feet. Most of the included soils are in the Saugerties-Glasco and Kingston-Lake Katrine sections of the county. Some included soils have a seasonal high water table below a depth of 3-1/2 feet.

This soil warms up early in spring. After frost leaves the soil in spring, the level of free water falls rapidly. Roots are mainly confined to the upper 3 feet of the soil, but a few deep-rooted crops obtain water at a greater depth. Available water capacity is moderate. Permeability is moderately rapid in the surface layer and subsoil and is very rapid in the substratum. Runoff is slow. In unlimed areas, reaction is very strongly acid or strongly acid throughout the soil.

Most of the acreage of this soil is used for cultivated crops, fruit crops, hay, pasture, housing, industry, or recreation. This soil has good potential for all of these uses.

This soil is well suited to a wide variety of crops including special crops (fig. 7). It is especially well suited to crops that are planted early in spring. This soil is moderately susceptible to drought in midsummer, but it responds to irrigation. Under a high level of management it is very productive. Applied lime and fertilizer are leached from this soil at a moderately rapid rate; consequently, response is generally better to smaller but more frequent or timely applications than to one large application. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation, help to conserve moisture, improve tilth, and maintain the content of organic matter.

This soil is well suited to orchards and vineyards. The crops are deep-rooted so they are not as susceptible to drought. Irrigation is necessary during prolonged dry periods for high production. Spraying operations generally can be performed without excessive soil compaction.

Woodland productivity is moderately high. Only a small acreage of this soil is wooded. Machine planting of tree seedlings is practical on this soil.

This soil is better than most soils in the county for a wide variety of urban and recreational uses. The included areas where the water table fluctuates to within 3-1/2 feet of the surface are poorly suited to buildings with basements. In areas where the soil is used for disposal of septic tank effluent, very rapid permeability in the substratum can result in contamination of ground water. Sloughing is a hazard in excavations in this soil. This soil is a good source of sand and topsoil. Capability subclass IIs.

RvB—Riverhead fine sandy loam, 3 to 8 percent slopes. This deep, well drained, gently sloping soil formed in water-laid deltaic deposits that were dropped as streams entered glacial lakes. It is on the top of deltas. Slopes are smooth and slightly convex. Areas are irregular in shape and are 10 to 80 acres in size.

Typically, the surface layer is dark brown fine sandy loam about 8 inches thick. The subsoil is very friable, dark yellowish brown and strong brown sandy loam that extends to a depth of about 26 inches. The substratum to a depth of about 62 inches is dark yellowish brown and brown loamy sand and sand.

Included with this soil in mapping are a few areas of a soil that is similar to the Riverhead soil but has medium textured and moderately fine textured layers in the substratum below a depth of 3-1/2 feet; small areas of Pompton and Walpole soils that are in depressions; and some areas of coarser textured Plainfield soils, but they are not extensive. Also included are areas of soils that have a surface layer of loam and sandy loam.

This soil warms up early in spring. Roots are mainly confined to the upper 3 feet of the soil, but a few deep-rooted crops obtain water at a greater depth. Available water capacity is moderate. Permeability is moderately rapid in the surface layer and subsoil and is very rapid in the substratum. Runoff is slow to medium. In unlimed areas, reaction is very strongly acid or strongly acid throughout the soil.

Most of the acreage of this soil is used for cultivated crops, fruit crops, hay, pasture, housing, industry, or recreation. This soil has good potential for all of these uses.

This soil is well suited to a wide variety of crops. It is especially well suited to crops that are planted early in spring. The hazard of erosion is moderate to slight. The main concerns in management are controlling runoff and erosion and providing adequate moisture. Crops respond well to irrigation. Applied lime and fertilizer are leached from this soil at a moderately rapid rate; consequently, response is generally better to smaller but more frequent or timely applications than to one large application. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation, help to conserve moisture, improve tilth, and maintain the content of organic matter.

This soil is well suited to orchards and vineyards. The crops are deep-rooted so they are not as susceptible to drought. Irrigation is necessary during prolonged dry periods for high production. Spraying operations generally can be performed without excessive soil compaction.

Woodland productivity is moderately high. Only a small acreage of this soil is in woodland. Machine planting of tree seedlings is practical on this soil.

This soil is better than most soils in the county for a wide variety of urban and recreational uses. Erosion is a hazard during construction, especially on long, unprotected slopes. In areas where the soil is used for disposal of septic tank effluent, very rapid permeability in the substratum can result in contamination of ground water. Sloughing is a hazard in excavations in this soil. This soil is a good source of sand and topsoil. Capability subclass IIs.

RvC—Riverhead fine sandy loam, 8 to 15 percent slopes. This deep, well drained, sloping soil formed mainly in water-laid deltaic deposits that were dropped as streams entered glacial lakes. It is on the top and side of deltas. Most areas are oblong or long and narrow in shape and are 10 to 30 acres in size.

Typically, the surface layer is dark brown fine sandy loam about 8 inches thick. The subsoil is very friable, dark yellowish brown and strong brown sandy loam that extends to a depth of about 26 inches. The substratum to a depth of about 62 inches is dark yellowish brown and brown loamy sand and sand.

Included with this soil in mapping are small areas of Plainfield soils that are sandier than this Riverhead soil and are on the upper part of slopes and some spots of eroded soils. Also included are a few areas of a soil that is similar to the Riverhead soil but has medium textured and moderately fine textured layers within a depth of 40 inches that cause sidehill seep spots. The seep spots are shown on the soil map by a wet spot symbol.

This soil warms up early in spring. Roots are mainly confined to the upper 3 feet of the soil, but a few deep-rooted crops obtain water at a greater depth. Available water capacity is moderate. Permeability is moderately rapid in the surface layer and subsoil and is very rapid in the substratum. Runoff is medium. In unlimed areas, reaction is very strongly acid or strongly acid throughout the soil.

Most of the acreage of this soil is used for cultivated crops, orchards, vineyards, hay, pasture, woodland, or housing. This soil has fair potential for farming. Slope is a limitation for most urban uses.

This soil is suited to crops and pasture. It can be tilled early in spring, but it is moderately droughty. If this soil is intensively used for intertilled crops, erosion is a major hazard. The cropping system needs to include a high proportion of sod-forming crops and pasture. Contour farming is practical in some areas. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, and tillage at the proper moisture condition, help to improve tilth, conserve moisture, maintain the content of organic matter, and reduce the erosion hazard. Applied lime and fertilizer are leached from this soil at a moderately rapid rate; consequently, response is generally better to smaller but more frequent or timely applications than to one large application.

This soil is suited to orchards maintained in permanent sod cover, but it is only moderately suited to vineyards. Because vineyards are cultivated, erosion is a hazard. Spraying operations can generally be performed without excessive soil compaction.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

Even though slope limits many urban uses of this soil, most areas have potential for residential housing. Some areas are esthetic homesites. The hazard of erosion is severe during construction. A vegetative cover maintained on the site during construction helps prevent erosion. In areas where the soil is used for disposal of septic tank effluent, very rapid permeability in the substratum can result in contamination of ground water. Sloughing is a hazard in excavations in this soil. This soil is a good source of sand. Capability subclass IIIe.

RXC—Rock outcrop-Arnot complex, sloping. This map unit is made up of exposed bedrock and shallow, somewhat excessively drained to moderately well drained Arnot soils. It is mainly on the tops of the Shawangunk and Catskill Mountains. The soils formed in glacial till. The Arnot soils are intermingled with the outcrops throughout the unit, but are mainly on the lower part of slopes and on benches. Slope ranges from 8 to 15 percent. Areas in the Shawangunk Mountains are broad and irregular in shape and are 15 to more than 800 acres in size. Areas in the Catskill Mountains are mostly oval in shape and are 15 to 50 acres in size.

This unit is made up of about 45 percent Rock outcrop, 30 percent Arnot channery silt loam or channery loam, and 25 percent other soils. Areas in the Shawangunk Mountains have a higher percentage of Rock outcrop than those in the Catskill Mountains. Rock outcrop and Arnot soils form such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Arnot soil is very dark grayish brown channery loam about 3 inches thick. The subsoil is friable, dark yellowish brown, channery loam and very channery loam. Thick bedded gray sandstone and siltstone bedrock is at a depth of about 17 inches.

Included with this unit in mapping are small areas of very shallow soils that are similar to the Arnot soil but have bedrock at a depth of 5 to 10 inches. Also included are areas of Tuller, Morris, and Scriba soils that are wetter than this Arnot soil and are along small drainageways and in depressions. Many areas have slopes of 2 to 8 percent, and many areas in the Catskill Mountains are very bouldery. Also included are large areas of soils that are similar to the Arnot soil but have a surface layer of gravelly loam and a subsoil of gravelly fine sandy loam and very gravelly sandy loam. These similar soils are in the Shawangunk Mountains where bedrock is quartz pebble conglomerate and sandstone. Narrow strips of Lordstown and Oquaga soils are also included.

Arnot soils have free water above the bedrock for brief periods in spring and after heavy rain. The root zone consists of 10 to 20 inches of well aerated soil material over bedrock. In some areas, a few roots penetrate fractures in the bedrock. Available water capacity is very low, and plants wilt quickly during dry periods. Permeability is moderate. Runoff is rapid. In unlimed areas, reaction is extremely acid to medium acid throughout these soils.

This unit is used mainly for woodland and for wildlife habitat. It has poor potential for farming and for urban uses, but it has potential for some types of recreational developments. This unit is not used for crops and pasture.

Vegetation in this unit is sparse and stunted. Seedling mortality is high.

The high percentage of exposed bedrock, shallow depth to bedrock, and slope are severe limitations for community developments. This unit has potential for hiking. Capability subclass VIIIs.

RXE—Rock outcrop-Arnot complex, steep. This map unit is made up of exposed bedrock and shallow, somewhat excessively drained to moderately well drained Arnot soils mainly on the tops and sides of the Shawangunk and Catskill Mountains. The Arnot soils are mainly somewhat excessively drained. These very bouldery soils formed in glacial till. They are intermingled with outcrops throughout the unit, but are mainly on narrow benches and on the lower part of slopes. Slope ranges from 25 to 35 percent. Areas are irregular in shape and are 15 to 300 acres in size.

This unit is made up of about 45 percent Rock outcrop, 30 percent Arnot very bouldery loam or very bouldery silt loam, and 25 percent soils of minor extent. Percentages in areas, however, vary considerably. For example, some areas are 75 percent Rock outcrop and 25 percent Arnot soils. Areas in the Shawangunk Mountains have a higher percentage of Rock outcrop than those in the Catskill Mountains. Rock outcrop and Arnot soils form such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Arnot soil is very dark grayish brown, very bouldery loam about 2 inches thick. The subsoil is friable, yellowish brown, very channery loam. Gray sandstone and siltstone bedrock is below a depth of about 14 inches.

Included with this unit in mapping are narrow strips of Lordstown and Oquaga soils that have bedrock at a depth of 20 to 40 inches and small areas of very shallow soils that are similar to the Arnot soil but have bedrock at a depth of 5 to 10 inches. Most areas have slopes of 15 to 25 percent. Also included are large areas of soils that are similar to the Arnot soil but have a subsoil of gravelly fine sandy loam and very gravelly sandy loam and are in the Shawangunk Mountains where bedrock is quartz pebble conglomerate and sandstone. Some areas are extremely bouldery.

Arnot soils have free water above the bedrock for brief periods in spring and after heavy rain. The root zone consists of 10 to 20 inches of well aerated soil material over bedrock. In some areas, a few roots penetrate fractures in the bedrock. Available water capacity is very low, and plants wilt quickly during dry periods. Permeability is moderate. Runoff is very rapid. Boulders cover 0.1 to 3 percent of the surface of these soils. They are dominantly 2 to 6 feet across and 1 to 2 feet thick, but many are smaller and a few are larger. Distance between boulders is quite variable but is generally 5 to 30 feet. Reaction is extremely acid to medium acid throughout the Arnot soils.

Most of the acreage of this unit is used for wildlife habitat. Steep slopes, high percentage of exposed bedrock, boulders, and shallow depth to bedrock prevent most uses except woodland, recreation, and wildlife habitat.

Vegetation is sparse and stunted. Seedling mortality is high because of droughtiness.

This unit has potential for hiking and lookout points from the higher escarpments. Construction for urban and recreational developments is extremely difficult. Capability subclass VIIIs.

RXF—Rock outcrop-Arnot complex, very steep. This map unit is made up of exposed bedrock and shallow, somewhat excessively drained to moderately well drained Arnot soils mainly on the sides of the Shawangunk and Catskill Mountains. The Arnot soils are mostly somewhat excessively drained. These extremely bouldery soils formed in glacial till. They are mainly on narrow benches and foot slopes below the Rock outcrop on escarpments. Slope ranges from 35 to 90 percent. Most areas are long and narrow in shape and are 20 to 200 acres in size.

This unit is made up of about 55 percent Rock outcrop, 30 percent Arnot extremely bouldery loam and extremely bouldery silt loam, and 15 percent other soils. However, the percentages in areas vary considerably. Areas in the Shawangunk Mountains have a higher percentage of Rock outcrop than those in the Catskill Mountains. Rock outcrop and Arnot soils form such an intricate pattern that they are not shown separately on the soil map.

Typically, the subsoil of the Arnot soil is directly below the forest litter and humus. It is friable, brown, extremely bouldery silt loam in the upper 3 inches and friable, reddish brown, very channery silt loam in the lower 11 inches. Dusty red, fractured shale bedrock is at a depth of about 14 inches.

Included with this unit in mapping are small areas of very shallow soils that are similar to the Arnot soil but have bedrock at a depth of 5 to 10 inches; Lordstown and Oquaga soils that are at the base of slopes and have bedrock at a depth of 20 to 40 inches; and large areas of soils that are similar to the Arnot soil but have a subsoil of gravelly fine sandy loam and very gravelly sandy loam, in the Shawangunk Mountains where bedrock is quartz pebble conglomerate and sandstone.

Arnot soils have free water above the bedrock for brief periods in spring and after heavy rain. The root zone consists of 10 to 20 inches of well aerated soil material over bedrock. In some areas, a few roots penetrate fractures in the bedrock. Available water capacity is very

low, and plants wilt quickly during dry periods. Permeability is moderate. Runoff is very rapid. Boulders are dominantly 2 to 4 feet thick and 2 to 10 feet across, but some are smaller and a few are larger. They are spaced about 2.5 to 5 feet apart. In many areas they occur as rock rubble at the base of vertical cliffs or bedrock escarpments. Reaction is extremely acid to medium acid throughout the Arnot soils.

The very steep slopes, shallow depth to bedrock, boulders, and high percentage of exposed bedrock severely affect all uses. Most of the acreage of this unit is used for wildlife habitat. Some areas have potential for lookout points from the higher escarpments.

Vegetation is very sparse. Seedling mortality is high because of droughtiness.

Construction for urban and recreational developments is extremely difficult. Capability subclass VIIIs.

SaB—Schoharie silt loam, 3 to 8 percent slopes. This deep, gently sloping moderately well drained and well drained soil formed in lake-laid deposits of clay and silt. It is mainly moderately well drained. This soil is on low knolls and on ridgetops on dissected lake plains and other landforms that are mantled with lake sediment. Slopes are slightly convex. Most areas are long and narrow or irregular in shape and are 5 to 40 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsurface layer is leached, reddish brown silty clay loam about 2 inches thick. The subsoil extends to a depth of about 36 inches. It is firm and very firm, reddish brown silty clay and has mottles below a depth of 15 inches. The substratum to a depth of about 50 inches is mottled, reddish brown, varved silty clay and silty clay loam.

Included with this soil in mapping are small areas of somewhat poorly drained Odessa and Raynham soils in slight depressions and along drainageways. A few areas are included between Kerhonkson and Wawarsing in the Rondout Creek Valley and between Olive Bridge and Big Indian in the Esopus Creek Valley that have 6 to 35 inches of gravelly loam outwash, similar to the surface layer and upper part of the subsoil in Castile soils, over the lake sediment. Also included are narrow strips of Cayuga, Mardin, and Wellsboro soils that are in lake sediment less than 40 inches thick over glacial till; a few areas near Olive Bridge that have a surface layer of gravelly loam or gravelly silt loam; and small areas of Williamson soils that are more silty than this Schoharie soil.

This soil has a perched seasonal high water table at a depth of 18 to 36 inches in spring and in other excessively wet periods. Roots are mainly confined to the upper 20 to 30 inches, but a few extend below this depth. Available water capacity in the root zone is moderate to high. Permeability is moderately slow in the surface layer and is slow or very slow in the subsoil and substratum. This soil becomes puddled and cloddy if it is cultivated when wet. Runoff is medium. In unlimed areas, reaction is medium acid to neutral in the surface layer and is medium acid to mildly alkaline in the subsoil.

Most of the acreage of this soil is used for crops, pasture, and woodland. This soil has good potential for farming and for some recreational uses, but it has limited potential for urban development.

This soil is better suited to crops and pasture that support dairy farms and beef cattle farms than to most other uses. Seasonal wetness, slow permeability, and high content of clay and silt in the subsoil limit the suitability of this soil for special crops and fruit crops. Seasonal wetness delays planting in some years. This soil needs to be cultivated at the proper moisture condition because it is sticky when wet and hard when dry. Hard clods and a crusty surface form if the soil is cultivated when wet. Planting when this soil is very dry generally results in poor seed germination. The hazard of erosion is severe in cultivated areas that are not protected. Standard management practices, for example, contour farming, minimum tillage, use of cover crops, incorporating crop residue into the soil, crop rotation, good fertilization, and pasturing and harvesting at the proper moisture condition help to control erosion, improve tilth, and maintain the content of organic matter. Random drainage of the included wet spots is beneficial in some fields.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

The perched seasonal high water table, low strength, and slow and very slow permeability in the subsoil and substratum are limitations for urban uses. This soil is better suited to buildings without basements than to those with basements. Spread footings, foundation drains, and protective coatings on the exterior walls of basements are needed. The subbase of roads needs to be thicker than that commonly used. Effluent from many septic tank absorption fields seeps to the surface in this soil. Therefore, the absorption field needs to be much larger than those commonly installed. A vegetative cover maintained on the site during construction helps prevent erosion. Capability subclass IIe.

SaC—Schoharie silt loam, 8 to 15 percent slopes. This deep, moderately well drained and well drained, sloping soil formed in lake-laid deposits of clay and silt. It is mainly on dissected lake plains and other landforms that are mantled with lake sediment. Slopes are short and convex. Areas are long and narrow or irregular in shape and are 5 to 50 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsurface layer is leached, reddish brown silty clay loam about 2 inches thick. The subsoil extends to a depth of about 36 inches. It is firm and very firm, reddish brown silty clay and has mottles below a depth of 15 inches. The substratum to a depth of about

50 inches is mottled, reddish brown, varved silty clay and silty clay loam.

Included with this soil in mapping are narrow strips of somewhat poorly drained Odessa and Raynham soils that are in low-lying areas near drainageways; small areas on the upper part of many slopes of an eroded soil that has a surface layer of silty clay loam; and a few areas between Kerhonkson and Wawarsing in the Rondout Creek Valley and between Olive Bridge and Big Indian in the Esopus Creek Valley that have 6 to 35 inches of gravelly loam outwash, similar to the surface layer and upper part of the subsoil in Chenango soils, over the lake sediment. Also included are narrow strips of Cayuga, Wellsboro, and Mardin soils on the upper part of slopes where the lake sediment is less than 40 inches thick over glacial till and narrow strips of a soil that is similar to the Schoharie soil but has bedrock at a depth of 20 to 40 inches.

This soil has a perched seasonal high water table at a depth of 18 to 36 inches in spring and in other excessively wet periods. Roots are mainly confined to the upper 20 to 30 inches of the soil, but a few extend below this depth. Available water capacity in the root zone is moderate to high. Permeability is moderately slow in the surface layer and is slow or very slow in the subsoil and substratum. This soil becomes puddled and cloddy if it is cultivated when wet. Runoff is rapid. In unlimed areas, reaction is medium acid to neutral in the surface layer and is medium acid to mildly alkaline in the subsoil.

Most of the acreage of this soil is used for crops, pasture, and woodland. This soil has fair potential for farming, but it has limited potential for urban developments. It has potential for woodland and for some recreational uses, such as paths and trails.

This soil is suited to cultivated crops, but it is best suited to hay and pasture. Slope causes some difficulty in farming. Seasonal wetness, high content of clay and silt in the subsoil, and slow or very slow permeability also limit the suitability of this soil for special crops and fruit crops. If this soil is intensively used for intertilled crops, erosion is a major hazard. If proper management and conservation measures are practiced, intertilled crops can be grown, but the cropping system needs to include a high proportion of sod-forming crops and pasture. This soil needs to be cultivated at the proper moisture condition because it is sticky when wet and fairly hard when dry. Hard clods and a crusty surface forms if the soil is cultivated when wet. Planting when this soil is very dry generally results in poor seed germination. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, contour farming, good fertilization, and pasturing and harvesting at the proper moisture condition, help to control erosion, improve tilth, and maintain the content of organic matter. The shallow waterways that cross some areas need special attention; some need permanent sod cover to control erosion, and others need drainage for wet spots.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

The perched seasonal high water table, low strength, slope, and slow or very slow permeability in the subsoil and substratum are limitations for most urban and recreational uses. Effluent from many septic tank absorption fields seeps to the surface in this soil. Therefore, the absorption field needs to be much larger than those commonly installed. Spread footings are needed because of low strength of the soil. Foundation drains and protective coatings on the exterior walls of basements are needed. Cut slopes are subject to slippage. The subbase of roads need to be thicker than that commonly used. The hazard of erosion is severe during construction. A vegetative cover maintained on the site during construction helps prevent erosion. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. In some areas, this soil is a suitable site for ponds. Capability subclass IIIe.

Sc—Scio silt loam. This deep, nearly level, moderately well drained soil formed in gravel-free, water-deposited material that is high in content of silt and very fine sand. It is mainly on stream terraces above the present flood plains, but a few areas are on glacial outwash terraces. Slope ranges from 0 to 2 percent. Most areas are oblong or long and narrow in shape and are 5 to 40 acres in size.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The upper part of the subsoil to a depth of about 19 inches is friable, yellowish brown silt loam and has mottles below a depth of 14 inches. The lower part of the subsoil to a depth of about 35 inches is friable, mottled, brown and strong brown silt loam. The substratum to a depth of about 55 inches is mottled, brown silt loam in the upper part and mottled, reddish brown fine sandy loam in the lower part.

Included with this soil in mapping are narrow strips of Raynham soils that are wetter than this Scio soil and are in depressions; narrow strips of Unadilla soils that are drier and on slight rises; and a few areas of a soil that is similar to the Scio soil that has a somewhat higher reaction. Also included, in the Wallkill and Shawangunk Kill Valleys, are a few areas of soils that have stratified sand and gravel at a depth of 20 to 40 inches.

This soil mainly is on glacial outwash and stream terraces that are not subject to flooding. Some areas are on low stream terraces that are subject to flooding during periods of higher than normal rainfall. This soil has a seasonal high water table at a depth of 18 to 24 inches in spring and in other excessively wet periods. Roots are mainly confined to a depth of 18 to 24 inches, depending on the depth to the seasonal high water table. Available water capacity of this zone is moderate. Permeability is moderate in the surface layer and subsoil and is rapid to

slow in the substratum. This soil has good workability. Surface runoff is slow. In unlimed areas, reaction is very strongly acid to medium acid in the surface layer and subsoil.

Most of the acreage of this soil is used intensively for cultivated crops, special crops, hay, and pasture. This soil has good potential for farming. In some areas, seasonal wetness and the flooding limit urban uses.

This soil is suited to cultivated crops, special crops, hay, and pasture. Many areas are used for sweet corn and field corn. Seasonal wetness delays planting in some years. Artificial drainage is needed in areas of the wetter included soils. Because of the frost hazard, this soil is not suited to orchards and vineyards. Keeping the soil from crusting after rains and maintaining tilth and a high level of fertility are also main management concerns. Minimum tillage, incorporating crop residue into the soil, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management. Soil compaction is a concern in areas where this soil is used for sweet corn because harvesting is commonly performed during wet periods. Use of lighter machinery with wider tire treads or use of specially designed machinery helps prevent soil compaction.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

The seasonal high water table and the flooding hazard in a few areas on low stream terraces are limitations for urban uses. Many dwellings have wet basements in spring and in other excessively wet periods. Foundation drains and protective coatings on the exterior walls of basements are needed. Roads need artificial drainage and a subbase that is thicker than that commonly used. This soil has potential for many recreational uses. It is also a good source of topsoil. Capability subclass IIw.

SdB—Scriba and Morris soils, 0 to 8 percent slopes. This map unit consists of deep, somewhat poorly drained, nearly level and gently sloping soils that formed in glacial till. The soils are on foot slopes and toe slopes on uplands. Slopes are concave and smooth. Areas have some undulation. Most areas are oblong or irregular in shape and are 5 to 20 acres in size.

Most areas of this unit consist of Scriba soils, or of Morris soils, or of both of these soils. Scriba soils are mainly on the foothills of the Shawangunk Mountains and on the plateau adjacent to the Catskill Mountains, and Morris soils are in the Catskill Mountains.

Typically, the surface layer of the Scriba soil is dark grayish brown gravelly fine sandy loam about 9 inches thick. The subsurface layer is leached, firm, mottled, grayish brown gravelly fine sandy loam that extends to a depth of 13 inches. The subsoil is a mottled fragipan that extends to a depth of about 50 inches. The upper 6 inches of the subsoil is firm, brown gravelly fine sandy loam, and the lower 31 inches is very firm, dark yellowish brown gravelly fine sandy loam.

Typically, the surface layer of the Morris soil is dark grayish brown flaggy silt loam about 8 inches thick. The subsoil extends to a depth of about 65 inches. The upper 4 inches of the subsoil is friable, mottled, grayish brown flaggy silt loam; the next 3 inches is firm, mottled, reddish brown gravelly loam; and the lower 50 inches is a very firm, mottled, reddish brown gravelly loam fragipan. The substratum to a depth of about 80 inches is reddish brown gravelly loam.

Included with these soils in mapping are moderately well drained Wurtsboro and Wellsboro soils that make up as much as 10 percent of some areas and are on low knolls; narrow strips of Menlo soils that are wetter than these Scriba and Morris soils and are in low areas and along drainageways; and a few nearly level areas of soils that have as much as 20 inches of local silty sediment over the weathered glacial till. Also included are a few spots of moderately deep and somewhat poorly drained soils that are similar to Morris and Scriba soils but have bedrock within a depth of 20 to 40 inches.

Late in fall, in winter, and in spring a temporary high water table is perched above the fragipan. Roots are confined mainly to the 12 to 18 inches of soil above the fragipan in the Morris soils and the 12 to 22 inches in the Scriba soils. Available water capacity of this zone is very low to low. In periods of average rainfall, plants seldom are affected by lack of moisture, but during extended dry periods these soils are droughty. Permeability is moderate above the fragipan in both soils, is slow in the fragipan and substratum of the Scriba soils, and is slow or moderately slow in the fragipan and substratum of the Morris soils. Runoff is slow to medium. In unlimed areas, reaction of the Scriba soils is extremely acid to slightly acid in the surface layer and is strongly acid to neutral in the subsoil. Reaction of the Morris soils is very strongly acid to medium acid in the surface layer and upper part of the subsoil and is strongly acid to slightly acid in the fragipan.

Most of the acreage of these soils is used for hay, pasture, and woodland to which they are well suited. These soils have fair potential for farming, but they have limited potential for many urban uses.

Drained areas of these soils are suited to cultivated crops, hay, and pasture. Controlling excess water is a major management need. Wetness limits the suitability of these soils for crops that are planted early in spring. Undrained areas are suited to mixtures of grasses and water-tolerant legumes for hay and pasture, but keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. Diversion terraces are needed in many cases to divert runoff from adjacent higher areas. In some places, subsurface drains are needed to effectively drain wet spots that limit the use of an area. However, systematic subsurface draining of an entire area is commonly not feasible, because lines must be very close together to give uniform drainage. Gravel and small stones hinder tillage in some areas. Standard man-

agement practices, for example, minimum tillage, use of cover crops, good fertilization, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation, help to improve tilth and maintain the content of organic matter.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on these soils. Wetness limits the suitability for some species.

The seasonal high water table and slow or moderately slow permeability are limitations for most urban uses. Effluent from many septic tank absorption fields moves to the surface in these soils. Therefore, specially designed absorption fields are needed. These soils are better suited to dwellings without basements than to those with basements. Foundation drains and protective coatings on the exterior walls of basements help to prevent wetness in basements. Some areas have potential for recreational uses. Capability subclass IIIw.

SEB—Scriba and Morris very bouldery soils, gently sloping. This map unit consists of deep, somewhat poorly drained soils that formed in glacial till on glaciated uplands. These soils are on broad flats and concave foot slopes and toe slopes. Slope ranges from 3 to 8 percent. Most areas are long and narrow or oblong in shape and are 5 to 90 acres in size.

These soils rarely occur together. Most areas are made up only of Scriba very bouldery soils or of Morris very bouldery soils. Scriba soils are mainly on the foothills of the Shawankgunk Mountains and on the plateau adjacent to the Catskill Mountains, and Morris soils are in the Catskill Mountains.

Typically, the surface layer of the Scriba soil is very dark grayish brown, very bouldery fine sandy loam about 9 inches thick. The subsurface layer is leached, firm, mottled, grayish brown gravelly fine sandy loam that extends to a depth of about 13 inches. The subsoil is a mottled fragipan that extends to a depth of about 50 inches. The upper 6 inches of the subsoil is firm, brown gravelly fine sandy loam, and the lower 31 inches is dark yellowish brown, very firm gravelly fine sandy loam.

Typically, the surface layer of the Morris soil is dark grayish brown, very bouldery silt loam about 6 inches thick. The subsoil extends to a depth of about 65 inches. The upper 4 inches of the subsoil is friable, mottled, grayish brown flaggy silt loam; the next 3 inches is firm, mottled, reddish brown gravelly loam; and the lower 52 inches is a very firm, mottled, reddish brown gravelly loam fragipan. The substratum to a depth of about 80 inches is reddish brown gravelly loam.

Included with these soils in mapping are a few small areas of Wellsboro and Wurtsboro soils on low knolls; narrow strips of Menlo soils in depressions and along small drainageways; and a few small areas of nonbouldery and extremely bouldery soils. Also included are small areas of soils that are similar to the Scriba and Morris soil but have bedrock within a depth of 20 to 40 inches.

Late in fall, in winter, and in spring a temporary high water table is perched above the fragipan. Roots are confined mainly to the 12 to 18 inches of soil above the fragipan in the Morris soils and the 12 to 22 inches in the Scriba soils. Available water capacity of this zone is very low to low. In periods of average rainfall, plants seldom are affected by lack of moisture, but during extended dry periods these soils are droughty. Permeability is moderate above the fragipan in both soils, is slow in the fragipan and substratum of the Scriba soils, and is slow or moderately slow in the fragipan and substratum of the Morris soils. Most areas of these soils receive runoff and seepage from higher-lying areas. Runoff is medium. Boulders cover 0.1 to 3 percent of the surface of these soils. They are dominantly 2 to 6 feet across and 1 to 2 feet thick, but some are smaller and a few are larger. Distance between boulders is quite variable, but it is generally 5 to 30 feet. In unlimed areas, reaction of the Scriba soils is extremely acid to slightly acid in the surface layer and is strongly acid to neutral in the subsoil. Reaction of the Morris soils is very strongly acid to medium acid in the surface layer and upper part of the subsoil and is strongly acid to slightly acid in the fragipan.

Most of the acreage of these soils is used for woodland and for wildlife habitat to which they are well suited. These soils have poor potential for farming and for community developments. The potential for many uses is increased by drainage and by removal of surface boulders.

These soils are too bouldery for cultivation. Some areas are used for hay and permanent pasture, but the boulders limit the use of large machines in fertilizing and mowing. After boulders are removed, undrained areas are suited to mixtures of grasses and water-tolerant legumes for hay and pasture, but keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. Wetness limits the suitability of these soils for crops that are planted early in spring. Diversion terraces can be used in many cases to divert runoff from adjacent higher areas. In some places, subsurface drains can be used effectively to drain wet spots that limit the use of an area. However, systematic subsurface draining of an entire area is commonly not feasible, because lines must be very close together to give uniform drainage. Standard management practices, for example, minimum tillage, contour farming, and good fertilization, help to control erosion and promote good tilth.

Woodland productivity is moderately high. The boulders present difficulty in machine planting of tree seedlings. Wetness limits the suitability of these soils for some species.

The seasonal high water table, boulders, and slow or moderately slow permeability are severe limitations for most urban uses. Effluent from many septic tank absorp-

tion fields moves to the surface in these soils. Therefore, specially designed absorption fields are needed. These soils are better suited to dwellings without basements than to those with basements. Foundation drains and protective coatings on the exterior walls of basements help to prevent wetness in basements. Some areas have potential for recreational uses. Capability subclass VIIs.

SGB—Scriba and Morris extremely bouldery soils, gently sloping. This map unit consists of deep, somewhat poorly drained soils that formed in glacial till on glaciated uplands. The soils are on broad flats and concave foot slopes and toe slopes. Slope ranges from 3 to 8 percent. Most areas are long and narrow or oblong in shape and are 10 to 40 acres in size.

Areas consist entirely of Scriba soils, or entirely of Morris soils, or of both of these soils. Boulders dominate the capabilities of these soils so much that the difference between the Scriba and Morris soils is relatively unimportant. Scriba soils are mainly on the foothills of the Shawangunk Mountains and on the plateau adjacent to the Catskill Mountains, and Morris soils are in the Catskill Mountains.

Typically, the surface layer of the Scriba soil is very dark grayish brown, extremely bouldery fine sandy loam about 4 inches thick. The subsurface layer is leached, mottled, grayish brown gravelly fine sandy loam 9 inches thick. The subsoil is a very firm, mottled, light olive brown gravelly fine sandy loam fragipan that extends to a depth of about 50 inches.

Typically, the surface layer of the Morris soil is very dark gray, extremely bouldery silt loam about 4 inches thick. The subsoil extends to a depth of about 65 inches. The upper 6 inches of the subsoil is friable, mottled, grayish brown flaggy silt loam; the next 7 inches is firm, mottled, reddish brown gravelly loam; and the lower 48 inches is a firm, mottled, reddish brown very gravelly loam fragipan. The substratum to a depth of about 80 inches is reddish brown gravelly loam.

Included with these soils in mapping are narrow strips of Menlo soils that are in depressions and along small drainageways; small areas of Wurtsboro and Wellsboro soils that are on low knolls; a few small areas of soils that are very bouldery; and a few areas of Volusia soils in the eastern part of the county that are extremely bouldery. Most areas have slopes of 0 to 3 percent and 8 to 12 percent. Also included are spots of moderately deep somewhat poorly drained soils that are similar to the Scriba and Morris soils but have bedrock within a depth of 20 to 40 inches.

Late in fall, in winter, and in spring a temporary high water table is perched above the fragipan. Roots are confined mainly to the 12 to 18 inches of soil above the fragipan in the Morris soils and the 12 to 22 inches in the Scriba soils. Available water capacity of this zone is very low to low. Permeability is moderate above the fragipan in both soils, is slow in the fragipan and substratum of the Scriba soils, and is slow or moderately slow in the fragipan and substratum of the Morris soils. Runoff is medium. Boulders cover 3 to 15 percent of the surface of these soils. They are dominantly 2 to 4 feet thick and 2 to 10 feet across, but some are smaller and a few are larger. They are about 2.5 to 5 feet apart in most areas. The subsoil and substratum generally contain considerably less boulders than the surface layer contains. In unlimed areas reaction of the Scriba soils is acid to slightly acid in the surface layer and is strongly acid to neutral in the subsoil. Reaction of the Morris soils is very strongly acid to medium acid in the surface layer and upper part of the subsoil and is strongly acid to slightly acid in the fragipan.

Most of the acreage of these soils is used for woodland and for wildlife habitat to which they are best suited. These soils have poor potential for farming and for urban and recreational developments.

Woodland productivity is moderately high. The surface boulders are moderate limitations to use of large machines in logging. Woodland plantings are extremely difficult to make. Wetness limits the suitability of these soils for some species.

Boulders cause difficulty in construction for urban developments. Wetness and slow or moderately slow permeability also limit the use of these soils for community developments and for recreational uses. Foundation drains and protective coatings on the exterior walls of basements are needed. Care should be taken when hiking on these extremely bouldery soils. Capability subclass VIIs.

SmB—Stockbridge-Farmington gravelly silt loams, 3 to 8 percent slopes. This map unit consists of a deep, well drained Stockbridge soil and a shallow, well drained and somewhat excessively drained Farmington soil. These gently sloping soils formed in glacial till. Areas consist mainly of one or two very low ridges that are cored by folded and tilted limestone bedrock. The Stockbridge soil is between ridges where runoff does not accumulate, and the Farmington soil is on the sides and tops of the bedrock ridges. Areas are oblong in shape and are 5 to 40 acres in size.

This unit is made up of about 50 percent Stockbridge gravelly silt loam, 30 percent Farmington gravelly silt loam, and 20 percent other soils.

Stockbridge and Farmington soils occur in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Stockbridge soil is dark brown gravelly silt loam about 7 inches thick. The upper part of the subsoil to a depth of about 20 inches is friable and firm, brown gravelly loam. The lower part of the subsoil is firm, gravelly silt loam that is yellowish brown and brown to a depth of about 31 inches and dark brown to a depth of about 34 inches. The substratum to

a depth of about 56 inches is dark brown gravelly silt loam over fractured limestone bedrock.

Typically, the surface layer of the Farmington soil is dark brown gravelly silt loam about 7 inches thick. The subsoil to a depth of about 15 inches is friable, yellowish brown silt loam and gravelly silt loam. Fractured limestone bedrock is at a depth of about 15 inches.

Included with these soils in mapping are narrow strips of Valois, Bath, Mardin, Schoharie, and Hudson soils that are intermingled with the Stockbridge soil in areas between ridges; Volusia, Rhinebeck, Odessa, and Raynham soils that are wetter than these Stockbridge and Farmington soils and are in slight depressions between ridges; and narrow strips of a moderately deep and well drained soil that is similar to the Farmington soil but has bedrock at a depth of 20 to 40 inches and is intermingled with the major soils throughout the unit. A few outcrops of rock are included on ridges, and most of them are shown on the soil map with the rock outcrop symbol. In a few areas, the Farmington and Stockbridge soils are underlain by calcareous shale bedrock. Also included are small areas of Riverhead and Pompton soils in areas between ridges.

The Stockbridge soil has free water for brief periods in the slowly permeable substratum at a depth of 3 to 6 feet in winter, in spring, and in other excessively wet periods. Roots are generally unrestricted above the substratum, which is at a depth of 24 to 36 inches. Available water capacity of this zone is moderate to high. Depth to bedrock is more than 40 inches. Permeability is moderate in the surface layer and subsoil and is slow in the substratum.

Roots in the Farmington soil are confined mostly to the 10 to 20 inches of soil above the fractured limestone bedrock, but a few roots penetrate cracks in the bedrock. Available water capacity is low to very low because of shallowness to bedrock. Permeability is moderate.

Runoff is medium from both soils. In unlimed areas, reaction of the Stockbridge soil is strongly acid to slightly acid in the surface layer and is strongly acid to neutral in the subsoil. Reaction of the Farmington soil is strongly acid to slightly acid in the surface layer and is medium acid to neutral in the subsoil.

Most of the acreage of this unit is used for crops, pasture, or woodland, or it is idle. These soils have fair potential for farming. The variable depth to bedrock limits intensive use.

This unit is well suited to hay and pasture. It is suited to cultivated crops, but the undulating topography, occasional bedrock outcrops, and small stones hinder tillage. Available water capacity is quite variable within short distances. The uneven topography is not suitable for conservation practices other than sod-forming crops, minimum tillage, cover crops, and incorporating crop residue into the soil. Standard management practices, for example, tillage at the proper moisture condition, crop rotation, and good fertilization, help to improve tilth, maintain the content of organic matter, and reduce the hazard of erosion.

Fruit crops are suited to these soils if irrigation is available. The low or very low available water capacity of the Farmington soil affects fruit size in dry years.

Woodland productivity is moderatley high on the Stockbridge soil and poor on the Farmington soil. Machine planting of tree seedlings is practical on these soils.

The variable depth to bedrock, small stones, and slight wetness of the Stockbridge soil are limitations for most community developments and recreational uses. The soils have potential for such recreational uses as picnic areas and paths and trails. They also have potential for dwellings without basements if public sewers are available. In areas where the soils are used for disposal of septic tank effluent, fissures in the limestone bedrock can result in contamination of ground water. Dwellings with basements in the Stockbridge soil need foundation drains and protective coatings on the exterior walls of basements. Erosion is a hazard during construction. A vegetative cover maintained on the site helps prevent erosion. Capability subclass IIIe.

SmC—Stockbridge-Farmington gravelly silt loams, 8 to 15 percent slopes. This map unit consists of a deep, well drained Stockbridge soil and a shallow, well drained and somewhat excessively drained Farmington soil. These sloping soils formed in glacial till. Areas consist mainly of one or two ridges that are cored by folded and tilted limestone bedrock. The ridges are generally oriented in a northeast-southwest direction. Relief is irregular. The Stockbridge soil is between ridges and the Farmington soil is on the tops and sides of the bedrock ridges. Areas are long and narrow or irregular in shape and are 5 to 30 acres in size.

This unit is made up of about 45 percent Stockbridge gravelly silt loam, 35 percent Farmington gravelly silt loam, and 20 percent other soils. Stockbridge and Farmington soils occur in such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Stockbridge soil is dark brown gravelly silt loam about 7 inches thick. The upper part of the subsoil to a depth of about 20 inches is friable and firm, brown gravelly loam. The lower part of the subsoil is firm, gravelly silt loam that is yellowish brown and brown to a depth of about 31 inches and dark brown to a depth of 34 inches. The substratum to a depth of about 56 inches is dark brown gravelly silt loam over fractured limestone bedrock.

Typically, the surface layer of the Farmington soil is dark brown gravelly silt loam about 7 inches thick. The subsoil extends to a depth of about 15 inches. It is friable, yellowish brown silt loam and gravelly silt loam. Fractured limestone bedrock is at a depth of about 15 inches.

Included with these soils in mapping are narrow strips of a moderately deep, well drained soil that is intermingled with the major soils throughout the unit and is similar to the Farmington soil but has bedrock at a depth of 20 to 40 inches; a few areas of Rock outcrop, which are shown on the soil map by a rock outcrop symbol; small areas of Volusia, Rhinebeck, Odessa, and Raynham soils that are wetter than these Stockbridge and Farmington soils and are in slight depressions between ridges and a few areas of Farmington and Stockbridge soils that are underlain with calcareous shale bedrock. Also included are small areas of Bath, Valois, Mardin, Riverhead, Pompton, Hudson, and Schoharie soils that are intermingled with the Stockbridge soil between ridges.

The Stockbridge soil has free water in the slowly permeable substratum for brief periods at a depth of 3 to 6 feet in winter, in spring, and in other excessively wet periods. Roots are generally unrestricted above the substratum, which is at a depth of 24 to 36 inches. Available water capacity of this zone is moderate to high. Depth to bedrock is more than 40 inches. Permeability is moderate in the surface layer and subsoil and is slow in the substratum.

Roots in the Farmington soil are confined mostly to the 10 to 20 inches of soil above the fractured limestone bedrock, but a few roots penetrate cracks in the bedrock. Because of shallowness to bedrock, the available water capacity is low to very low. Permeability is moderate in Farmington soil.

Runoff is rapid from both soils. In unlimed areas, reaction of the Stockbridge soil is strongly acid to slightly acid in the surface layer and is strongly acid to neutral in the subsoil. Reaction of the Farmington soil is strongly acid to slightly acid in the surface layer and is medium acid to neutral in the subsoil.

Most of the acreage of this unit is used for hay, pasture, and woodland for which it has good potential. Some areas are used for orchards and cultivated crops. The variable depth to bedrock and irregular relief limit intensive use of these soils. The unit has fair to poor potential for cultivated crops.

These soils can be cropped successfully, but the cropping system needs to include pasture and a high proportion of sod-forming crops. Available water capacity is quite variable within short distances. The hazard of erosion is severe. Conservation practices, other than sod-forming crops, use of cover crops, incorporating crop residue into the soil, and minimum tillage, are very difficult because of the uneven topography. Standard management practices, for example, tillage at the proper moisture condition, crop rotation, and good fertilization help to improve tilth, maintain the content of organic matter, and reduce the hazard of erosion.

Orchards maintained in permanent sod are suited to this unit. Since vineyards are clean cultivated, they are poorly suited to these soils because of the hazard of erosion. The low or very low available water capacity of the Farmington soil affects fruit size in dry years.

Woodland productivity is moderately high on the Stockbridge soil and poor on the Farmington soil. Machine planting of tree seedlings is practical on these soils.

The slope, variable depth to bedrock, gravel and small stones, and slight wetness of the Stockbridge soil are limitations for most community developments and recreational uses. The soils have potential for such recreational uses as picnic areas and paths and trails. There are some esthetic homesite areas, but sites for sewage disposal can be very limiting. This unit has potential for dwellings without basemets if public sewers are available. In areas where the soils are used for disposal of septic tank effluent, fissures in the limestone bedrock can result in contamination of ground water. Dwellings with basements in the Stockbridge soil need foundation drains and protective coatings on the exterior walls of basements. Erosion is a hazard during construction. A vegetative cover maintained on the site helps prevent erosion. Capability subclass IVe.

STD—Stockbridge-Farmington-Rock outcrop complex, hilly. This map unit consists of a deep, well drained Stockbridge soil; a shallow, well drained and somewhat excessively drained Farmington soil; and small areas of exposed bedrock. These soils formed in glacial till. Areas consist mainly of a series of ridges that are cored by folded and tilted limestone bedrock. The ridges are generally oriented in a northeast-southwest direction. The Stockbridge soil is between ridges where runoff water does not accumulate. The Farmington soil is on the sides of the ridges and is intermingled with rock outcrops on the tops of ridges. Relief is very irregular. Slopes are short and generally complex. They are dominantly 10 to 25 percent but range from 10 to 30 percent. Areas are long and narrow or irregular in shape and are 10 to 150 acres in size.

This unit is made up of about 30 percent Stockbridge gravelly silt loam, 30 percent Farmington gravelly silt loam, about 20 percent Rock outcrop, and 20 percent other soils. These soils and the Rock outcrop form such an intricate pattern that they are not shown separately on the soil map.

Typically, the surface layer of the Stockbridge soil is dark brown gravelly silt loam about 5 inches thick. The upper part of the subsoil to a depth of about 20 inches is friable, yellowish brown gravelly silt loam. The lower part of the subsoil to a depth of 29 inches is firm, brown gravelly loam. The substratum to a depth of 48 inches is dark brown gravelly loam over fractured limestone bedrock.

Typically, the surface layer of the Farmington soil is dark brown gravelly silt loam about 5 inches thick. The subsoil extends to a depth of about 15 inches. It is friable, yellowish brown silt loam and gravelly silt loam.

Fractured limestone bedrock is at a depth of about 15 inches.

Included with these soils in mapping is a moderately deep, well drained soil that is intermingled with the major soils throughout the unit and is similar to the Farmington soil but has bedrock at a depth of 20 to 40 inches; narrow strips of Volusia, Lyons, Palms, Raynham, Canandaigua, Odessa, and Rhinebeck soils that are in slight depressions between the ridges; and a few areas of Farmington and Stockbridge soils that are underlain with calcareous shale bedrock. Also included are narrow strips of Bath, Mardin, Valois, Riverhead, Pompton, Plainfield, Chenango, Hudson, and Schoharie soils that are intermingled with the Stockbridge soil between ridges. Many areas of included soils have slopes of 3 to 10 percent.

The Stockbridge soil has free water in the slowly permeable substratum at a depth of 3 to 6 feet in winter, in spring, and in other excessively wet periods. Roots are generally unrestricted above the substratum, which is at a depth of 24 to 36 inches. Available water capacity of this zone is moderate to high. Depth to bedrock is more than 40 inches. Permeability is moderate in the surface layer and subsoil and is slow in the substratum.

Roots in the Farmington soil are confined mostly to the 10 to 20 inches of soil above the fractured limestone bedrock, but a few roots penetrate cracks in the bedrock. Because of shallowness to bedrock, available water capacity is low to very low. Permeability is moderate.

Runoff is medium to very rapid. In unlimed areas, reaction of the Stockbridge soil is strongly acid to slightly acid in the surface layer and is strongly acid to neutral in the subsoil. Reaction of the Farmington soil is strongly acid to slightly acid in the surface layer and is medium acid to neutral in the subsoil.

These soils and the Rock outcrop are used mainly for woodland and for wildlife habitat to which they are well suited. Some areas are in permanent pasture. Many abandoned limestone mines are in the unit. This unit has poor potential for farming, but it has potential for quarrying and for some types of recreational developments.

Farm uses are affected by the variable depth to bedrock and by slope and rock outcrops. Areas are not suited to cultivation with large machinery. Available water capacity is quite variable within short distances. The hazard of erosion is severe. Rock outcrops and slope hinder fertilizing and mowing of pasture. This unit is not used for orchards and vineyards.

Woodland productivity is moderately high on the Stockbridge soil and poor on the Farmington soil. Rock outcrops seriously interfere with machine planting of tree seedlings.

The variable depth to bedrock, slope, rock outcrops, and slight wetness of the Stockbridge soil are severe limitations for most urban uses of this unit. Esthetic homesite are in some areas, but sites for sewage disposal can be very limiting. In areas where the soils are used for disposal of septic tank effluent, fissures in the limestone bedrock can result in contamination of ground water. Dwellings with basements in the Stockbridge soil need foundation drains and coatings on the exterior walls of basements. A vegetative cover maintained on the site during construction helps prevent erosion. Most areas have potential for quarrying and for use as paths and trails. Capability subclass VIs.

Su—Suncook loamy fine sand. This deep, nearly level, excessively drained soil formed in recent sandy alluvial deposits. It is on flood plains adjacent to the streams. This soil is subject to flooding. Slope ranges from 0 to 3 percent. Areas are long and narrow in shape and are 5 to 30 acres in size.

Typically, the surface layer is very dark grayish brown loamy fine sand about 3 inches thick. The underlying layers extend to a depth of about 53 inches and are dark grayish brown loamy fine sand. One layer, between a depth of about 27 and 36 inches, is stratified with fine sand.

Included with this soil in mapping are small areas of well drained Tioga and Barbour soils; some areas in small stream valleys that have a surface layer of gravelly loamy fine sand or cobbly loamy fine sand and have stratified sand and gravel below a depth of 20 inches; and some areas of soils that have thin layers of fine sandy loam and sandy loam in the substratum. Also included are thin, narrow strips of Tunkhannock soils on glacial-stream terraces and areas of Alluvial land bordering the streams.

This soil is subject to flooding at any time of the year, but it commonly is flooded for brief periods when runoff is heavy during winter and spring. The seasonal high water table in most areas is controlled by the water level in the adjacent streams and generally is at a depth of 3 to 6 feet during winter and spring. The roots of deep-rooted plants extend to 4 or 5 feet, but most roots are within the upper 30 or 40 inches of the soil. This soil dries quickly after rain, and shallow-rooted plants wilt after a few rainless days. Available water capacity is very low to low. Permeability is rapid or very rapid. Runoff is very slow or slow. In unlimed areas, reaction is very strongly acid to slightly acid throughout the soil.

The flooding hazard limits the use of this soil. Areas in the larger stream valleys are mainly used for crops, hay, and pasture; whereas those in the small stream valleys are used for pasture, for woodland, and for wildlife habitat. This soil has fair potential for farming and poor potential for most community developments.

This is an early soil for cropping. Crops that require large quantities of water late in the growing season are not well suited to this soil, unless irrigation is provided. When this soil is irrigated, it is suited to most crops, including special crops. The surface layer of loamy fine sand is a concern in tilling because some tillage equip-

ment, such as a disk harrow, cuts too deep. This soil responds well to good management. Because applied nutrients are rapidly leached from this soil, response is generally better to smaller but more frequent or more timely applications than to one large application. In some places, gouging by floodwaters and the undercutting of stream banks are concerns. Standard management practices, for example, incorporating crop residue into the soil, use of cover crops, tillage at the proper moisture condition, and crop rotation, help to improve tilth and maintain the content of organic matter.

Woodland productivity is poor. Machine planting of tree seedlings is practical on this soil. Seedling mortality is a hazard during dry years.

The hazard of flooding is a severe limitation for community developments. Facilities for such recreational uses as picnicking, golfing, and boating are moderately suited to this soil. If recreational buildings are constructed on the flood plain, they need to be anchored. Caving is a hazard in excavations in this soil. Capability subclass IIIs.

SwB—Swartswood stony fine sandy loam, 3 to 8 percent slopes. This deep, stony, gently sloping, well drained soil formed in glacial till. It is on uplands and receives little or no runoff from adjacent soils. Slopes are convex and smooth or gently undulating. Most areas are oblong in shape and are 5 to 35 acres in size.

Typically, the surface layer is brown stony fine sandy loam about 7 inches thick. The upper part of the subsoil extends to a depth of about 24 inches. It is friable, strong brown gravelly sandy loam. A firm and brittle, thin, leached layer of mottled, yellowish brown gravelly sandy loam about 5 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil extends to a depth of about 60 inches. It is a very firm and brittle, olive brown gravelly sandy loam fragipan.

Included with this soil in mapping are small areas of Wurtsboro and Scriba soils that are wetter than this Swartswood soil and are on slightly concave foot slopes, in seep spots, and in depressions; a few small areas of Valois soils that intermingled with the Swartswood soil but are not extensive; and narrow strips of Lordstown soils that have bedrock at a depth of 20 to 40 inches. Most of the included Scriba soils are shown on the soil map with the wet spot or intermittent stream symbol.

Free water is generally above the fragipan for brief periods late in fall, in winter, and early in spring. Because the fragipan is so dense, roots cannot easily penetrate it, so they are mostly confined to the 20- to 36-inch zone above the fragipan. Available water capacity of this zone is very low to moderate. Permeability is moderate above the fragipan and is slow or moderately slow in the fragipan and substratum. Runoff is medium. Approximately 0.01 to 0.1 percent of the surface is covered with large flat stones about 1 foot thick and 1 to 5 feet across. Stones are spaced about 30 to 100 feet apart. In unlimed areas, reaction is extremely acid to strongly acid throughout the soil.

Most of the acreage of this soil is used for pasture, long-term hay, and woodland. A few areas are cultivated. This soil has good potential for farming and for many recreational uses. It is more desirable than many other soils in the uplands as a site for buildings and other nonfarm uses.

Many areas of this soil, formerly used as cropland, are reverting to forest. Tillage of intertilled crops with large machinery is impractical because of the large stones. After stones are removed, this soil is suited to crops and pasture. Crops respond well to liming and fertilization. Erosion is a hazard in cultivated areas, especially if slopes are long. Standard management practices, for example, minimum tillage, contour farming, use of cover crops, crop rotation, and incorporating crop residue into the soil, help to control erosion, improve tilth, and maintain the content of organic matter.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

Because of slight seasonal wetness and slow or moderately slow permeability in the fragipan and substratum, this soil has limitations for many urban uses. This soil is better suited to dwellings without basements than to those with basements. Foundation drains and protective coatings on the exterior walls of basements are needed. Effluent from some septic tank absorption fields seeps to the surface in this soil. Effluent fields need to be much larger than those commonly installed because of the slow or moderately slow permeability in the fragipan and substratum. Capability subclass IIe.

SwC—Swartswood stony fine sandy loam, 8 to 15 percent slopes. This deep, stony, well drained, sloping soil formed in glacial till. It is on glaciated uplands where water does not accumulate. Slopes are convex. Most areas are irregular in shape and are 10 to 20 acres in size.

Typically, the surface layer is brown stony fine sandy loam about 7 inches thick. The upper part of the subsoil extends to a depth of about 24 inches. It is friable, strong brown gravelly sandy loam. A leached layer of mottled, yellowish brown, firm and brittle gravelly sandy loam about 5 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil extends to a depth of about 60 inches. It is a very firm and brittle, olive brown gravelly sandy loam fragipan.

Included with this soil in mapping are small areas of Lordstown soils that have bedrock at a depth of 20 to 40 inches; some areas of Wurtsboro soils that are at the base of slopes; a few small areas of Valois soils that are intermingled with the Swartswood soil, but not extensively; and narrow strips of Hoosic soils that formed in water-sorted glacial outwash. Also included are a few hillside

seeps that are shown on the soil map with the wet spot symbol.

Free water is generally above the fragipan for brief periods late in fall, in winter, and early in spring. Because the fragipan is so dense, roots cannot easily penetrate it, so they are mostly confined to the 20- to 36-inch zone above the fragipan. Available water capacity of this zone is very low to moderate. Permeability is moderate above the fragipan and is slow or moderately slow in the fragipan and substratum. Runoff is rapid. Approximately 0.01 to 0.1 percent of the surface is covered with large flat stones more than 1 foot thick and 1 to 5 feet across. Stones are spaced about 30 to 100 feet apart. In unlimed areas, reaction is extremely acid to strongly acid throughout the soil.

Most of the acreage of this soil is used for pasture, long-term hay, and forest. This soil has fair potential for farming. It is better than many soils on the uplands for many nonfarming uses, such as homesites and paths and trails.

Many areas of this soil that were formerly cropland are reverting to forest. There is a sufficient number of large stones. Because of large stones, tillage of intertilled crops by large machinery is impractical. After stones are removed, this soil is suited to crops and pasture. Crops respond well to liming and fertilization. Prevention of erosion is a major concern, especially if slopes are long. A large proportion of sod farming crops are needed in the cropping system. Standard management practices, for example, contour farming, minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation help to control erosion, improve tilth, and maintain the content of organic matter.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

Because of the slight seasonal wetness, slope, and slow or moderately slow permeability in the fragipan and substratum, this soil has limitations for many urban uses. Effluent from some septic tank absorption fields seeps to the surface in this soil. Absorption fields need to be much larger than those commonly installed because of the slowly permeable fragipan. In areas where public sewers are available, the soil is only moderately limited for residential housing. Foundation drains and exterior coatings on the walls of basements are needed. Erosion is a hazard during construction. A vegetative cover maintained on the site during construction helps prevent erosion. Capability subclass IIIe.

Te—Teel silt loam. This deep, nearly level, moderately well drained to somewhat poorly drained soil formed in silty alluvium derived from limestone, shale, and fine grained sandstone. It is mainly in long, narrow strips on first bottoms and is subject to flooding. Slope ranges from 0 to 2 percent. Areas range from 5 to 75 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The upper part of the subsoil extends to a depth of about 16 inches and is friable, brown silt loam. The lower part of the subsoil extends to a depth of about 38 inches and is friable, mottled, dark yellowish brown silt loam. The substratum to a depth of about 50 inches is mottled, dark yellowish brown silt loam.

Included with this soil in mapping are a few narrow strips of well drained Hamlin soils in slightly higher, nearly level areas; areas of poorly drained and very poorly drained Wayland soils in depressions and low areas; and thin strips of the Scio soils on stream terraces. Also included are a few small areas of Middlebury soils that are more sandy than this Teel soil and are on flood plains.

This soil is subject to flooding at any time of the year, but it commonly is flooded for brief periods when runoff is heavy late in fall, in winter, and in spring. A seasonal high water table is at a depth of 6 to 24 inches in winter, in spring, and in other excessively wet periods. Roots are controlled by the water table and are mainly confined to the upper 24 inches of the soil. Available water capacity of this zone is moderate. Permeability is moderate throughout the soil. Runoff is slow or very slow. In unlimed areas, reaction is strongly acid or medium acid in the surface layer and is medium acid to neutral in the subsoil.

Most of the acreage of this soil is used for crops, pasture, and woodland. This soil has good potential for farming and poor potential for most community developments.

This soil is suited to crops, hay, and pasture. Special crops can be grown, but flooding in some years can cause crop loss. Flooding and seasonal wetness are the main limitations. Spring planting is delayed because of wetness. Artificial surface and subsurface drains are needed in intensively cultivated areas for high production. Because of the hazards of frost and flooding, this soil is not suited to orchards and vineyards. Keeping the soil from crusting after rains and maintaining tilth and a high level of fertility are also main management concerns. Minimum tillage, incorporating crop residue into the soil, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management. Soil compaction is a hazard in areas where this soil is used for vegetables because harvesting is sometimes performed during wet periods. Use of lighter machinery with wider tire treads or use of specially designed machinery helps to prevent soil compaction.

Woodland productivity is high. Machine planting of tree seedlings is practical on this soil.

The flooding hazard and seasonal wetness are severe limitations for community developments. This soil has potential for such recreational uses as paths and trails, golfing, and boating. If recreational buildings are constructed on the flood plain, they need to be anchored.

This soil is one of the best sources of topsoil in the county. Capability subclass IIw.

Tg—Tioga fine sandy loam. This deep, nearly level, well drained soil formed in alluvium derived from sandstone, siltstone, and shale. It is on first bottoms adjacent to the streams and is subject to flooding. Slope ranges from 0 to 3 percent. Areas are long and narrow in shape and are 5 to 45 acres in size.

Typically, the surface layer is dark brown fine sandy loam about 10 inches thick. The very friable subsoil extends to a depth of about 34 inches. It is dark brown fine sandy loam in the upper part and dark yellowish brown very fine sandy loam in the lower part. The substratum to a depth of about 65 inches has three layers. The upper 6 inches of the substratum is brown loamy fine sand; the next 13 inches is mottled, dark yellowish brown silt loam; and the lower 12 inches is mottled, dark yellowish brown fine sandy loam.

Included with this soil in mapping are small areas of Middlebury and Wayland soils that are wetter than this Tioga soil and are in lower positions and in depressions and small areas of soils that have a surface layer of loam and very fine sandy loam. Also included are narrow strips of Suncook soils and Alluvial land that border the streams and Unadilla soils on stream terraces.

This soil is subject to flooding at any time of the year, but it commonly is flooded for brief periods when runoff is heavy during winter and spring. The seasonal high water table in most areas is controlled by the water level in the adjacent streams and generally is at a depth of 3 to 6 feet during winter and spring. There are no restrictions to rooting. Available water capacity is high. Permeability is moderate in the surface layer and subsoil and is moderately rapid or rapid in the substratum. This soil has good workability. Runoff is slow. In unlimed areas, reaction is strongly acid or medium acid in the surface layer and is strongly acid to neutral in the subsoil.

Most of the acreage of this soil is used for cultivated crops, special crops, hay, and pasture. This soil has good potential for farming and poor potential for most community developments.

In the wide stream valleys, this soil is used intensively for sweet corn and field corn. It is highly productive of all the crops commonly grown in the county. Because of the hazards of frost and flooding, this soil is not suited to orchards and vineyards. Farm machinery is easy to use. Flooding is a hazard, but it is rare during the growing season. In some places, gouging by floodwater (fig. 8) and the undercutting of stream banks are concerns. The main management concern is maintaining tilth and a high level of fertility. Minimum tillage, incorporating crop residue into the soil, use of cover crops, and tilling and harvesting at the proper moisture condition, are important in management. Soil compaction is a hazard because harvesting of sweet corn is sometimes performed during wet periods. Use of lighter machinery with wider tire treads or use of specially designed machinery helps to prevent soil compaction.

Woodland productivity is high. Only a very small acreage of this soil is wooded. Machine planting of tree seedlings is practical on this soil.

The hazard of flooding is a severe limitation for community developments. This soil has potential for such recreational uses as picnicking, golfing, and boating. If recreational buildings are constructed on the flood plain, they need to be anchored. This soil is a good source of topsoil. Capability subclass IIw.

TkA—Tunkhannock gravelly loam, 0 to 3 percent slopes. This deep, well drained to somewhat excessively drained, nearly level soil formed in glacial outwash. It is on the flat part of glacial outwash terraces, fans, and valley trains. Most areas are long and narrow in shape and are 10 to 200 acres in size.

Typically, the surface layer is dark reddish brown gravelly loam about 7 inches thick. The upper part of the subsoil extends to a depth of about 23 inches. It is friable, yellowish red and reddish brown gravelly loam. The lower part of the subsoil to a depth of about 30 inches is very friable, reddish brown very gravelly loam. The substratum is reddish brown stratified gravel and sand and extends to a depth of about 80 inches.

Included with this soil in mapping are small areas of Castile and Red Hook soils that are wetter than this Tunkhannock soil and are in low areas; narrow strips of Barbour and Suncook soils and Alluvial land that are in the small stream valleys and are subject to flooding; and some small areas of soils that have a surface layer of gravelly silt loam and gravelly fine sandy loam. Also included are areas where underground flow or high stream flow causes a seasonal high water table below a depth of 3 1/2 feet.

This soil warms up early in spring. After frost leaves the soil in spring, the level of free water drops rapidly. Roots of deep-rooted crops and trees penetrate the gravelly substratum, but most roots are confined to the upper 22 to 35 inches of the soil. Available water capacity of this zone is low to moderate. Droughtiness is a hazard in drier periods during the growing season. Permeability is moderately rapid in the surface layer and subsoil and is moderately rapid or rapid in the substratum. Runoff is slow. In unlimed areas, reaction is extremely acid to medium acid in the surface layer and subsoil.

Most of the acreage of this soil is used for cultivated crops, hay, pasture, or woodland. In the small stream valleys, some of the acreage is used for roads, homesites, and related community uses, or it is idle. This soil has good potential for farming and for urban and recreational developments.

This soil is well suited to a wide variety of crops. It is not naturally a highly productive soil, but it responds well to good management. Irrigation is needed, especially for

shallow-rooted crops, during prolonged dry periods. Coarse gravel and cobblestones interfere with cultivation. Applied lime and fertilizer are leached from this soil at a moderate rate; consequently, response is generally better to smaller but more frequent or timely applications than to one large application. Minimum tillage, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation help to improve tilth and maintain the content of organic matter.

Woodland productivity is moderately high. Only a small acreage of this soil is wooded. Machine planting of tree seedlings is practical on this soil.

This soil is well suited to many urban uses. It has potential for recreational uses, even though gravel and cobblestones interfere with many of these uses. In a few places, streambank erosion is serious, and flooding is a hazard on some of the included soils. The included areas where the water table fluctuates to within 3 1/2 feet of the surface are not suited to buildings with basements. In areas where this soil is used for disposal of septic tank effluent, moderately rapid or rapid permeability in the substratum can result in contamination of ground water. Sloughing is a hazard in excavations in this soil. This soil is a good source of gravel in most areas. Capability subclass IIs.

TkB—Tunkhannock gravelly loam, 3 to 8 percent slopes. This deep, well drained to somewhat excessively drained, gently sloping soil formed in glacial outwash. It is on glacial outwash terraces, fans, and valley trains. Most areas are long and narrow in shape and are 10 to 50 acres in size.

Typically, the surface layer is dark reddish brown gravelly loam about 7 inches thick. The upper part of the subsoil extends to a depth of about 23 inches. It is friable, yellowish red and reddish brown gravelly loam. The lower part of the subsoil to a depth of about 30 inches is very friable, reddish brown very gravelly loam. The substratum is reddish brown stratified gravel and sand that extends to a depth of about 80 inches.

Included with this soil in mapping are Castile and Red Hook soils that are wetter than this Tunkhannock soil and are in low areas and seep spots and narrow strips of Barbour and Suncook soils and Alluvial land that are in the small stream valleys and are subject to flooding. Also included are small areas of soils that have a surface layer of gravelly silt loam and gravelly fine sandy loam.

This soil warms up early in spring. After frost leaves the soil in spring, the level of free water drops rapidly. Roots of deep-rooted crops and trees penetrate the gravelly substratum, but most roots are confined to the upper 22 to 35 inches of the soil. Available water capacity of this zone is low to moderate. Droughtiness is a hazard in drier periods during the growing season. Permeability is moderately rapid in the surface layer and subsoil and is moderately rapid or rapid in the substratum. Runoff is slow to medium. In unlimed areas, reaction is extremely acid to medium acid in the surface layer and subsoil.

Most of the acreage of this soil is used for cultivated crops, hay, pasture, woodland, or homesites. This soil is suited to a wide variety of uses and has good potential for farming.

This soil is well suited to crops and pasture. It is not naturally a highly productive soil, but it responds well to good management. Erosion is a hazard on long slopes. Coarse gravel and cobblestones interfere with cultivation. Irrigation is needed, especially for shallow-rooted crops, during prolonged dry periods. Applied lime and fertilizer are leached from this soil at a moderate rate; consequently, response is generally better to smaller but more frequent or timely applications than to one large applciation. Practices such as minimum tillage, cover crops, incorporating crop residue into the soil, crop rotation, and tillage at the proper moisture condition conserve moisture, improve tilth, and maintain the content of organic matter. These measures and contour cultivation in areas that have simple slopes generally provide adequate water control.

Woodland productivity is moderately high. Only a small acreage of this soil is wooded. Machine planting of tree seedlings is practical on this soil.

This soil is well suited to a wide variety of urban uses. It has potential for recreational uses even though gravel and cobblestones interfere with many of these uses. In areas where this soil is used for disposal of septic tank effluent, moderately rapid or rapid permeability in the substratum can result in contamination of ground water. Sloughing is a hazard in excavations in this soil. This soil is a good source of gravel in most areas. Capability subclass IIs.

TkC—Tunkhannock gravelly loam, rolling. This deep, well drained to somewhat excessively drained soil formed in glacial outwash. It is mainly on kames that slope in many directions. Slopes are smooth in a few areas that are on faces of outwash terraces. They range from 5 to 16 percent. Areas of this soil are mainly irregular in shape and are 5 to 140 acres in size.

Typically, the surface layer is dark reddish brown gravelly loam about 7 inches thick. The upper part of the subsoil extends to a depth of about 23 inches. It is friable, yellowish red and reddish brown gravelly loam. The lower part of the subsoil to a depth of about 30 inches is very friable, reddish brown very gravelly loam. The substratum is reddish brown stratified gravel and sand that extends to a depth of about 80 inches.

Included with this soil in mapping are small areas of Castile and Red Hook soils that are wetter than this Tunkhannock soil, are in depressions and nearly level areas, and are shown on the soil map with the wet spot symbol; small areas of soils that are on the tops and sides of kames and have a surface layer of gravelly

sandy loam; and narrow strips of well drained Valois soils that are at the base of some hillocks and formed in glacial till.

This soil warms up early in spring. Roots of deep-rooted crops and trees penetrate the gravelly substratum, but most roots are confined to the upper 22 to 35 inches of the soil. Available water capacity of this zone is low to moderate. Droughtiness is a hazard in drier periods during the growing season. Permeability is moderately rapid in the surface layer and subsoil and is moderately rapid or rapid in the substratum. Runoff is medium to rapid. In unlimed areas, reaction is extremely acid to medium acid in the surface layer and subsoil.

This soil is used mainly for hay, pasture, or woodland. It has fair potential for farming and for most urban and recreational uses.

This soil can be cropped successfully, but the complex topography causes difficulty in intensive row cropping and in control of erosion. A high proportion of long-term hay or pasture is needed in the cropping system. Contour farming is not possible in most areas. Minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation help to improve tilth, maintain the content of organic matter, and reduce the hazard of erosion. The growth of crops is limited during extended dry periods. Conservation of moisture is very important. Coarse gravel and cobblestones interfere with cultivation. Applied lime and fertilizer are leached from this soil at a moderate rate; consequently, response is better to smaller but more frequent or timely applications than to one large application.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

Even though slope limits many urban uses of this soil, most areas have potential for residential housing. Some areas are esthetic homesites. Gravel and cobblestones interfere with many recreational uses. In areas where the soil is used for disposal of septic tank effluent, moderately rapid or rapid permeability in the substratum can result in contamination of ground water. Sloughing is a hazard in excavations in this soil. This soil is a good source of gravel in most areas. Capability subclass IIIe.

TuB—Tunkhannock gravelly loam, clayey substratum, 3 to 8 percent slopes. This deep, well drained to somewhat excessively drained, gently sloping soil formed in water-sorted glacial outwash material that overlies lake-deposited clay and silt at a depth of 3 1/2 to 6 feet. It is mainly on the uppermost terracelike landform in valleys. Areas are generally long and narrow in shape and are 10 to 25 acres in size.

Typically, the surface layer is dark reddish brown gravelly loam about 7 inches thick. The friable, reddish brown subsoil extends to a depth of about 30 inches. It is gravelly loam in the upper part and very gravelly loam in the lower part. The upper part of the substratum is reddish brown very gravelly loamy sand to a depth of about 40 inches, and the lower part is silty clay to a depth of about 80 inches.

Included with this soil in mapping are small areas of Odessa and Schoharie soils that formed in lake deposits; areas of Castile and Red Hook soils that are wetter than this Tunkhannock soil and are in low areas and seep spots; and small areas of Tunkhannock soils that do not have a clayey substratum or that have a glacial till substratum.

This soil warms up early in spring. Free water is above the clayey substratum for brief periods at a depth of 2 1/2 to 3 1/2 feet in spring and in other excessively wet periods. Lateral movement of water occurs above the clayey substratum and causes seep spots in some areas. Roots of deep-rooted crops and trees penetrate the clayey substratum, but most roots are confined to the upper 22 to 35 inches of the soil. Available water capacity is low to moderate. Droughtiness is a hazard in drier periods during the growing season for shallow-rooted plants. Permeability is moderately rapid in the surface layer and subsoil, is moderately rapid or rapid in the upper part of the substratum, and is very slow in the lower part of the substratum. Runoff is slow to medium. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and subsoil.

Most of the acreage of this soil is used for crops, hay, pasture, or woodland. This soil has good potential for farming, but it has poor potential for most urban uses.

This soil is well suited to crops and pasture. It is not naturally a highly productive soil, but it responds well to good management. Coarse gravel and cobblestones interfere with cultivation. Irrigation is needed for shallow-rooted crops during prolonged dry periods. Minimum tillage, cover crops, incorporating crop residue into the soil, crop rotation, good fertilization, and tillage at the proper moisture condition are important in management. Contour farming should also be used to control erosion. The included seep spots must be drained or avoided during most farming operations.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

The very slow permeability of the clay substratum and the seasonal high water table are the most important considerations for urban uses. The clayey substratum is unstable. Roads, industrial buildings, and other structures need special engineering design. This soil has potential for most recreational uses even though gravel and cobblestones interfere with many of these uses. It is a poor source of sand or gravel. Capability subclass IIs.

TuC—Tunkhannock gravelly loam, clayey substratum, 8 to 15 percent slopes. This deep, well drained to somewhat excessively drained, sloping soil formed in water-sorted glacial outwash material that overlies lake-deposited clay and silt at a depth of 3 1/2 to 6 feet. It is mainly on the sides of terracelike landforms in valleys.

Areas are long and narrow in shape and are 5 to 50 acres in size.

Typically, the surface layer is dark reddish brown gravelly loam about 7 inches thick. The friable, reddish brown subsoil extends to a depth of 30 inches. It is gravelly loam in the upper part and very gravelly loam in the lower part. The upper part of the substratum is reddish brown very gravelly loamy sand to a depth of about 42 inches, and the lower part is silty clay to a depth of about 80 inches.

Included with this soil in mapping are small areas of Odessa and Schoharie soils that formed in lake deposits; areas of Castile soils that are wetter than this Tunkhannock soil and are in seep spots; and a few areas of Tunkhannock soils that do not have a clayey substratum. Also included are narrow strips of Lackawanna and Wellsboro soils that formed in glacial till and are near breaks to the uplands.

This soil warms up early in spring. Free water is above the clayey substratum for brief periods at a depth of 2 1/2 to 3 1/2 feet in spring and in other excessively wet periods. Lateral movement of water occurs above the clayey substratum and causes seep spots in some areas. Roots of deep-rooted crops and trees penetrate the clayey substratum, but most roots are confined to the upper 22 to 35 inches of the soil. Available water capacity is low to moderate. Droughtiness is a hazard in drier periods during the growing season for shallow-rooted plants. Permeability is moderately rapid in the surface layer and subsoil, is moderately rapid or rapid in the upper part of the substratum, and is very slow in the lower part of the substratum. Runoff is medium to rapid. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and subsoil.

Most of the acreage of this soil is used for pasture or forest. This soil has fair potential for farming, but it has poor potential for most urban uses.

This soil is suited to crops, hay, or pasture. Under intensive use for intertilled crops, erosion is a major concern. Contour farming is practical in some areas. A high proportion of long-term hay or pasture is needed in the cropping system. Coarse gravel and cobblestones interfere with cultivation. Minimum tillage, good fertilization, use of cover crops, incorporating crop residue into the soil, and tillage at the proper moisture condition help to improve tilth, maintain the content of organic matter, and reduce the hazard of erosion. The growth of shallow-rooted crops is limited during prolonged dry periods.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

The slope, very slow permeability in the clayey substratum, and seasonal high water table are limitations for urban uses. Cut slopes are subject to slippage. The clayey substratum needs to be given special engineering consideration when planning construction or maintenance projects. This soil has potential for some recreational uses, such as paths and trails. It is a poor source of sand or gravel. Capability subclass IIIe.

TuD—Tunkhannock gravelly loam, clayey substratum, 15 to 25 percent slopes. This deep, well drained to somewhat excessively drained, moderately steep soil formed in water-sorted glacial outwash material that overlies lake-deposited clay and silt at a depth of 3 1/2 to 6 feet. It is mainly on the upper terracelike landforms in valleys. Seep spots are in most areas. Areas are long and narrow in shape and 5 to 25 acres in size.

Typically, the surface layer is dark reddish brown gravelly loam about 7 inches thick. The friable, reddish brown subsoil extends to a depth of about 30 inches. It is gravelly loam in the upper part and very gravelly loam in the lower part. The upper part of the substratum is reddish brown very gravelly loamy sand to a depth of about 42 inches, and the lower part is silty clay to a depth of about 80 inches.

Included with this soil in mapping are narrow strips of Schoharie soils that formed in fine textured and moderately fine textured lake deposits. Also included are a few areas of Hoosic soils, and narrow strips of Lackawanna soils are near breaks to the upland.

This soil warms up early in spring. Free water is above the clayey substratum at a depth of 2 1/2 to 3 1/2 feet for brief periods in spring and in other excessively wet periods. Lateral movement of water occurs above the clayey substratum and causes seep spots in most areas. Roots of deep-rooted crops and trees penetrate the clayey substratum, but most roots are confined to the upper 22 to 35 inches of the soil. Available water capacity is low to moderate. Droughtiness is a hazard in drier periods during the growing season for shallow-rooted plants. Permeability is moderately rapid in the surface layer and subsoil, is moderately rapid or rapid in the upper part of the substratum, and is very slow in the lower part. Runoff is rapid to very rapid. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and subsoil.

Most of the acreage of this soil is used for woodland and for wildlife habitat to which it is well suited. This soil has poor potential for farming and for urban uses.

This soil is poorly suited to cultivated crops. It can be cropped successfully, but the cropping system needs a high proportion of long-term hay or pasture. Use of tillage equipment is very difficult because of slope. Coarse gravel and cobblestones interfere with cultivation. Erosion is a severe hazard if the soil is cultivated and not protected. Contour farming, good fertilization, and minumum tillage are important in management. Lack of moisture for shallow-rooted crops is critical in many areas.

Woodland productivity is moderately high. The slope presents some difficulty in machine planting of tree seedlings.

The slope, very slow permeability in the clayey substratum, and seasonal high water table are severe limita-

tions for most urban uses. Cut slopes are subject to slippage. Special engineering consideration is needed for any type of construction because of the limited strength and the possibility of slippage. Trench absorption fields are difficult to construct. Controlling the downhill flow of effluent is a serious concern. The hazard of erosion is severe during construction. Trails in recreational areas need to be protected from erosion and established across the slope wherever possible. Capability subclass IVe.

Un—Unadilla silt loam. This deep, nearly level, well drained soil formed in gravel-free, water-deposited material that is high in content of silt and very fine sand. It is mainly on stream terraces above the flood plains. A few areas are on outwash terraces. Slope ranges from 0 to 3 percent. Along the lower reaches of Esopus and Rondout Creeks, areas are long and wide and are as much as 1,000 acres in size. In small stream valleys and on glacial outwash terraces, areas are long and narrow in shape and are considerably smaller in size.

Typically, the surface layer is dark yellowish brown silt loam about 10 inches thick. The subsoil extends to a depth of about 40 inches and is friable silt loam. It is dark yellowish brown in the upper 7 inches and brown in the lower 23 inches. The underlying material to a depth of about 60 inches is dark brown silt loam.

Included with this soil in mapping are small areas of Scio and Raynham soils that are wetter than this Unadilla soil and are in depressions; narrow strips of Tioga and Suncook soils that are on flood plains; and in the small stream valleys; narrow strips of a soil that is similar to the Unadilla soil but has sand and gravel or loamy sand in the substratum below a depth of 40 inches; and some areas of soils that are on short terrace faces and have slopes of 3 to 25 percent. Also included are a few areas that are near small streams of the wetter associated soils and have a water table which fluctuates to within 3 1/2 feet of the surface; some small areas of Riverhead soils; and areas of soils that have a surface layer of fine sandy loam.

This soil mainly is on glacial outwash and stream terraces that are not subject to flooding. Some areas on low stream terraces are subject to flooding during periods of above average rainfall. The water table is generally more than 6 feet below the surface. Roots can easily penetrate this friable soil to a depth of 40 inches and more. Available water capacity is high. Generally, crops do not show signs of wilting during dry periods. Permeability is moderate throughout the soil. This soil has good workability. Surface runoff is slow. Reaction is medium acid to neutral in the surface layer and subsoil.

Most of the acreage of this soil is used for cultivated crops, special crops, hay, and pasture. This soil has good potential for farming and for recreational uses.

This soil is used intensively for sweet corn and field corn. It is highly productive of all the crops commonly grown in the county. Because of the frost hazard, this soil is not suited to orchards and vineyards. Farm machinery is easy to use. The main management concerns are keeping the soil from crusting after rain and maintaining tilth and a high level of fertility. Minimum tillage, incorporating crop residue into the soil, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management. Soil compaction is a concern because harvesting of sweet corn sometimes is performed during wet periods. Use of lighter machinery with wider tire treads or use of specially designed machinery helps to prevent soil compaction. The hazard of erosion is slight, except on the included gently sloping to moderately steep terrace faces that are highly susceptible to erosion when the soil is used for cultivated crops.

Woodland productivity is high. Only a very small acreage of this soil is wooded. Machine planting of tree seedlings is practical on this soil.

Most areas of this soil are well suited to urban and recreational uses. Some areas on low stream terraces are poorly suited to buildings because of the flooding hazard. A thicker subbase for roads than that commonly used is needed because of the lack of strength of this silty soil. This soil is a good source of topsoil. Capability class I.

VAB—Valois very bouldery soils, gently sloping. These deep, well drained soils formed in glacial till. They are on knolls and on the lower parts of valleysides. Slope is generally complex and ranges from 3 to 8 percent. Most areas are irregular in shape and are 5 to 50 acres in size.

Typically, the surface layer in a wooded area is very bouldery loam about 2 inches thick. The subsoil extends to a depth of about 40 inches. The upper 9 inches of the subsoil is very friable, strong brown gravelly silt loam; the next 18 inches is friable, strong brown gravelly loam; and the lower 11 inches is friable, brown gravelly loam. The substratum to a depth of about 65 inches is dark brown very gravelly sandy loam.

Included with these soils in mapping are small areas of Lackawanna soils that have a fragipan; a few areas of Tunkhannock, Hoosic, and Chenango soils that are adjacent to glacial outwash terraces; and a few areas of moderately well drained Castile and Wellsboro soils that are on slightly concave foot slopes. Also included are some small areas of soils that are nonbouldery; a few areas of Morris and Red Hook soils that are in depressions; and very small areas of Lordstown and Oquaga soils that have bedrock at a depth of 20 to 40 inches. Many areas of included soils have slopes of 8 to 15 percent.

These soils have a seasonal high water table at a depth of 3 to 6 feet in winter, in spring, and in other excessively wet periods. Roots are generally unrestricted, but most roots are confined to the upper 30 to 40

inches of the soil. Available water capacity of this zone is moderate to high. Permeability is moderate in the surface layer and subsoil and is moderate or moderately rapid in the substratum. Runoff is medium to rapid. Boulders cover 0.1 to 3 percent of the surface of these soils. They are dominantly 1 to 2 feet thick and 2 to 6 feet across, but some are smaller and a few are larger. Distance between boulders is quite variable but is generally 5 to 30 feet. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and is very strongly acid to medium acid in the subsoil.

Most of the acreage of these soils is used for woodland and for wildlife habitat. Many areas are being developed for homesites. These soils have poor potential for farming. The potential for farming and for urban and recreational developments is greatly increased by removing boulders.

A few areas of these soils are used for hay and permanent pasture, but the boulders hinder fertilizing and mowing. Surface boulders need to be removed before the soils can be cultivated with large machines. These soils have good to fair potential for farming after boulders are removed. They are particularly well suited to deep-rooted legumes. Erosion is a hazard. The use of cover crops, contour farming, incorporating crop residue into the soil, crop rotation, and minimum tillage help to control erosion, conserve moisture, and promote good soil tilth.

Wodland productivity is moderately high. Surface boulders present some difficulty in machine planting of tree seedlings.

Boulders limit most urban and recreational uses. Some urban uses are also limited by slight seasonal wetness. These soils have potential for dwellings without basements, picnic areas, and paths and trails. Dwellings with basements need foundation drains and protective coatings on exterior walls of basements. Erosion is a hazard during construction. A vegetative cover maintained on the site helps prevent erosion. Capability subclass VIs.

VAD—Valois very bouldery soils, moderately steep. These deep, well drained soils formed in glacial till. They are mainly on the lower part of valley walls. Slope ranges from 15 to 25 percent. Areas are long and narrow or irregular in shape and are 10 to 60 acres in size.

Typically, the surface layer in a wooded area is dark brown very bouldery loam about 2 inches thick. The subsoil extends to a depth of about 40 inches. The upper 9 inches of the subsoil is very friable, strong brown gravelly silt loam; the next 18 inches is friable, strong brown gravelly loam; and the lower 11 inches is friable, brown gravelly loam. The substratum to a depth of about 65 inches is dark brown very gravelly sandy loam.

Included with these soils in mapping are small areas of Lackawanna, Swartswood, and Bath soils that have a fragipan; a few areas of Tunkhannock, Chenango, and Hoosic soils that are on the lower part of slopes; and some areas of moderately deep Oquaga and Lordstown soils that are on the upper part of slopes. Also included are a few hillside seeps and small nonbouldery areas. Many areas of included soils have slopes of 15 to 25 percent.

Free water is generally at a depth of 3 to 6 feet for periods in winter, in spring, and in other excessively wet periods. Roots are generally unrestricted, but most roots are confined to the upper 30 to 40 inches of the soil. Available water capacity in this zone is moderate to high. Permeability is moderate in the surface layer and subsoil and is moderate or moderately rapid in the substratum. Runoff is very rapid. Boulders cover 0.1 to 3 percent of the surface of these soils. They are dominantly 1 to 2 feet thick and 2 to 6 feet across, but some are smaller and a few are larger. Distance between boulders is quite variable but is generally 5 to 30 feet. In unlimed areas, reaction is very strongly acid or strongly acid in the surface layer and very strongly acid to medium acid in the subsoil.

Most of the acreage of these soils is used for woodland and for wildlife habitat. The best potential of these soils is for these uses. These soils have poor potential for farming and for urban and most recreational uses.

Slope and surface boulders are severe limitations for crops and pasture. After boulders are removed, the use of tillage equipment is very difficult, especially for large machines. The hazard of erosion is severe. Contour farming, minimum tillage, and good fertilization are important in management.

Woodland productivity is moderately high. Slope and surface boulders present difficulty in machine planting of tree seedlings.

Boulders and slope are severe limitations for most urban and recreational uses. The hazard of erosion is severe during construction. Trench absorption fields are difficult to layout and construct. Controlling the downhill flow of effluent is a serious concern. Most areas have potential for use as paths and trails. Capability subclass VIIs.

VoA—Volusia gravelly silt loam, 0 to 3 percent slopes. This deep, nearly level, somewhat poorly drained soil formed in glacial till. It is on foot slopes and broad hilltops and in drainageways. Most areas are long and narrow or irregular in shape and are 15 to 30 acres in size.

Typically, the surface layer is dark grayish brown gravelly silt loam about 8 inches thick. The upper part of the subsoil to a depth of about 15 inches is friable, mottled, yellowish brown gravelly silt loam. A firm, thin, leached layer of mottled, light brownish gray gravelly silt loam about 4 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil extends to a depth of about 58 inches and is a very firm

and brittle, olive brown gravelly silt loam fragipan. The substratum is olive brown gravelly silt loam that extends to a depth of about 70 inches.

Included with this soil in mapping are long, narrow areas of Lyons, Atherton, and Canandaigua soils that are wetter than this Volusia soil and are in depressions and along drainageways. Also included are a few small areas of Mardin soils that are on slight rises and areas that have as much as 20 inches of local silty sediment over the weathered glacial till.

This soil has a temporary water table within a few inches of the surface in winter, in spring, and in other excessively wet periods. Roots are mainly confined to the 15- to 20-inch zone above the fragipan. Available water capacity of this zone is low to very low. In periods of average rainfall, plants seldom are affected by lack of water, but during extended dry periods this soil is droughty. Permeability is moderate above the fragipan and is slow in the fragipan and substratum. Runoff is slow. In unlimed areas, reaction generally increases with depth from very strongly acid or strongly acid in the surface layer to very strongly acid to medium acid in the subsoil above the fragipan.

Most of the acreage of this soil is idle or is used for crops, hay, pasture, orchards, or woodland. This soil has fair potential for farming. Artificial drainage increases the potential for many uses.

Controlling excess water is a major management need. Wetness limits the suitability of this soil for crops that are planted early in spring. Drained areas are suited to crops and pasture. Undrained areas can be used for hay and pasture, but keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. Diversion terraces can be used in many cases to divert runoff from adjacent higher areas. Drainage in some areas can be improved by opening shallow drainageways from the lowest spots. Subsurface drains can be used effectively to drain wet spots that limit the use of an area. However, systematic subsurface draining of an entire area is commonly not feasible, because lines must be very close together to give uniform drainage. Gravel and small stones hinder tillage in some areas. Standard management practices, for example, minimum tillage, use of cover crops, good fertilization, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation, help to improve tilth and maintain the content of organic matter.

Drained areas of this soil have fair potential for fruit crops. Rootstalk that can tolerate wetness need to be used when establishing new orchards and vineyards. Soil compaction is a continuous hazard because spraying operations are often performed during wet periods. Use of lighter machinery with wider tire treads or use of specially designed machinery helps to prevent soil compaction.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical in large areas of this soil. Wetness limits the suitability of this soil for some species.

The seasonal high water table and slow permeability are limitations for most urban uses. Effluent from many septic tank absorption fields moves to the surface in this soil. Specially designed absorption fields are needed. Some areas of this soil have potential for recreational uses. Capability subclass IIIw.

VoB—Volusia gravelly silt loam, 3 to 8 percent slopes. This deep, gently sloping, somewhat poorly drained soil formed in glacial till. It is on foot slopes and undulating hilltops. Slopes are concave and uniform. Most areas are long and irregular in shape and are 15 to 30 acres in size.

Typically, the surface layer is dark grayish brown gravelly silt loam about 8 inches thick. The upper part of the subsoil extends to a depth of about 15 inches. It is friable, mottled, yellowish brown gravelly silt loam. A firm, leached layer of mottled, light brownish gray gravelly silt loam about 4 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil to a depth of about 58 inches is a very firm and brittle, olive brown very gravelly silt loam fragipan. The substratum is olive brown gravelly silt loam that extends to a depth of about 70 inches.

Included with this soil in mapping are small areas of Mardin soils that are better drained than this Volusia soil and narrow strips of Lyons, Atherton, and Canandaigua soils that are wetter and are in depressions and along drainageways. Also included are small areas of a soil that is similar to the Volusia soil but has bedrock at a depth of 20 to 40 inches. The moderately deep included soils are mainly in the towns of Plattekill and Marlboro.

This soil has a temporary water table within a few inches of the surface in winter, in spring, and in other excessively wet periods. Roots are confined mainly to the 15- to 20-inch zone above the fragipan. Available water capacity of this zone is low to very low. In periods of average rainfall, plants seldom are affected by lack of water, but during extended dry periods this soil is droughty. Permeability is moderate above the fragipan and is slow in the fragipan and substratum. Runoff is medium. In unlimed areas, reaction generally increases with depth from very strongly acid or strongly acid in the surface layer to very strongly acid to medium acid in the subsoil above the fragipan.

Most of the acreage of this soil is used for crops, hay, pasture, orchards, or woodland. This soil has fair potential for farming, and it has limited potential for many urban uses because of seasonal wetness and slow permeability.

Drained areas of this soil are suited to cultivated crops, hay, and pasture. Controlling excess water is a major management need. Wetness limits the suitability of this soil for crops that are planted early in spring. Undrained areas can be used for hay and pasture, but

keeping soil compaction to a minimum and maintaining desirable forage stands are difficult. Diversion terraces can be used in many cases to divert runoff from adjacent higher areas. In some places, subsurface drains can be used effectively to drain wet spots that limit the use of an area. However, systematic subsurface draining of an entire area is commonly not feasible, because lines must be very close together to give uniform drainage. Gravel and small stones hinder tillage in some areas. Standard management practices, for example, minimum tillage, use of cover crops, good fertilization, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation, help to improve tilth and maintain the content of organic matter.

Drained areas of this soil have fair potential for fruit crops. Rootstalk that can tolerate wetness need to be used when establishing new orchards and vineyards. Soil compaction is a continuous hazard because spraying operations are often performed during wet periods. Use of lighter machinery with wider tire treads or use of specially designed machinery helps to prevent soil compaction.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical in large areas of this soil. Wetness limits the suitability of this soil for some species.

The seasonal high water table and slow permeability are limitations for many urban uses. Effluent from most septic tank absorption fields moves to the surface in this soil. Therefore, specially designed absorption fields are needed. This soil is better suited to dwellings without basements than to those with basements. Some areas have potential for recreational uses. Capability subclass IIIw.

VoC—Volusia gravelly silt loam, 8 to 15 percent slopes. This deep, somewhat poorly drained sloping soil formed in glacial till. It is on foot slopes where it receives runoff and seepage from higher adjacent soils. Slopes are concave. Most areas are irregular in shape and are 15 to 25 acres in size.

Typically, the surface layer is dark grayish brown gravelly silt loam about 8 inches thick. The upper part of the subsoil extends to a depth of about 15 inches. It is friable, mottled, yellowish brown gravelly silt loam. A firm, thin, leached layer of mottled, light brownish gray gravelly silt loam about 4 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil to a depth of about 58 inches is a very firm and brittle, olive brown gravelly silt loam fragipan. The substratum is olive brown gravelly silt loam that extends to a depth of about 70 inches.

Included with this soil in mapping are small areas of Mardin soils that are better drained than this Volusia soil. Also included are narrow strips of a soil that is similar to the Volusia soil but has bedrock at a depth of 20 to 40 inches. The moderately deep included soils are mainly in the towns of Marlboro and Plattekill.

This soil has a temporary water table within a few inches below the surface in spring and during wet periods. Most areas remain wet from seepage water for significant periods after rain. Roots are confined mainly to the 15- to 20-inch zone above the fragipan. Available water capacity of this zone is low to very low. In periods of average rainfall, plants seldom are affected by lack of water, but during extended dry periods this soil is droughty. Permeability is moderate above the fragipan and is slow in the fragipan and substratum. Runoff is rapid. In unlimed areas, reaction generally increases with depth from very strongly acid or strongly acid in the surface layer to very strongly acid to medium acid in the subsoil above the fragipan.

Most of the acreage of this soil is used for hay, pasture, forest, and orchards. This soil has fair potential for farming. Water control is a severe limitation in the use of this soil as a building site.

This soil is suited to hay, pasture, woodland, and limited intertilled crops. Wetness delays planting and limits the choice of crops. Plants are adversely affected by lack of moisture during dry periods. Diversion of water that runs onto this soil is important in controlling wetness and in reducing the hazard of erosion. Draining of seep spots and low areas where runoff concentrates can greatly improve the productivity. Gravel and small stones hinder tillage in some areas. Standard management practices, for example, minimum tillage, use of cover crops, good fertilization, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation, help to improve tilth and maintain the content of organic matter.

Drained areas of this soil have fair potential for fruit crops. Rootstalk that can tolerate wetness need to be used when establishing new orchards and vineyards. Soil compaction is a continuous hazard because spraying operations are often performed during wet periods. Use of lighter machinery with wider tire treads or use of specially designed machinery helps to prevent soil compaction.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical in large areas of this soil. Wetness limits the suitability of this soil for some species.

The seasonal wetness and slow permeability in the fragipan are limitations to most community development and recreational uses. Effluent from many septic tank absorption fields moves to the surface in this soil. Therefore, specially designed absorption fields are needed. Some areas of this soil can be used for recreational uses but are better suited to other uses. Erosion is a hazard during construction. A vegetative cover maintained on the site during construction helps prevent erosion. Capability subclass IIIe.

VSB—Volusia very stony soils, gently sloping. These deep, very stony, somewhat poorly drained soils formed in glacial till. They are on foot slopes and on undulating hilltops and plains. Slopes are concave and uniform. They range from 3 to 8 percent. Areas are long and narrow or irregular in shape and are 10 to 150 acres in size.

Typically, the surface layer is dark grayish brown very stony silt loam about 6 inches thick. The upper part of the subsoil extends to a depth of about 15 inches. It is friable, mottled, yellowish brown gravelly silt loam. A firm, thin, leached layer of mottled, light brownish gray gravelly silt loam about 4 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil to a depth of about 58 inches is a very firm and brittle, olive brown very gravelly silt loam fragipan. The substratum is olive brown gravelly silt loam that extends to a depth of about 70 inches.

Included with these very stony soils in mapping are small areas of Mardin and Bath soils that are better drained than these Volusia soils and are in slightly higher positions; areas of Lyons, Atherton, and Canandaigua soils that are wetter and are in depressions and along drainageways; many areas of soils that have slopes of 0 to 3 percent and 8 to 15 percent; and some nearly level areas of soil that have as much as 20 inches of local silty sediment over the weathered glacial till. Also included are somewhat poorly drained Churchville soils in the Wallkill and Shawangunk Kill Valleys; a few small areas of soils that are nonstony; and narrow strips of a soil that is similar to the Volusia soils but have bedrock at a depth of 20 to 40 inches.

These soils have a temporary water table within a few inches of the surface in spring and during wet periods. Many areas receive runoff and seepage from adjacent soils. Roots are confined mainly to the 15- to 20-inch zone above the fragipan. Available water capacity of this zone is low to very low. In periods of average rainfall, plants seldom are affected by lack of water, but during extended dry periods these soils are droughty. Permeability is moderate above the fragipan and is slow in the fragipan and substratum. The stones are subrounded or angular and range from 10 inches to almost 4 feet across. They are spaced about 5 to 30 feet apart on the surface. Runoff ranges from slow to rapid depending on the slope. In unlimed areas, reaction generally increases with depth from very strongly acid or strongly acid in the surface layer to very strongly acid to medium acid in the subsoil above the fragipan.

Most of the acreage of these soils is used for woodland and for wildlife habitat. These soils have poor potential for farming. The potential for many uses can be increased by the removal of surface stones and by drainage.

Some areas of these soils are used for hay and permanent pasture, but the stones hinder fertilizing and mowing. Tillage of intertilled crops is impractical. After stones are removed, these soils can be managed like other Volusia soils. Contour farming, use of cover crops, and minimum tillage help to control erosion. These measures and tillage at the proper moisture condition help to promote good tilth.

Woodland productivity is moderately high. Surface stones present some difficulty in machine planting of tree seedlings. Wetness limits the suitability of these soils for some species.

Slow permeability in the fragipan, seasonal wetness, and stoniness are limitations for urban and recreational developments. Effluent from many septic tank absorption fields moves to the surface in these soils. Therefore, specially designed absorption fields are needed. These soils are better suited to dwellings without basements than to those with basements. Some areas have potential for recreational uses. Capability subclass VIIs.

Wa—Walpole fine sandy loam. This deep, somewhat poorly drained, nearly level soil formed in deltaic and outwash deposits. It is in low-lying wet areas on deltas and outwash terraces where it receives runoff from surrounding soils. Slope ranges from 0 to 2 percent. Most areas are long and narrow or irregular in shape and are 5 to 40 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam about 10 inches thick. The subsoil extends to a depth of 27 inches. It is friable and very friable, mottled, brown and dark grayish brown fine sandy loam, sandy loam, and loamy fine sand. The substratum to a depth of 60 inches is mottled, gray loamy sand.

Included with this soil in mapping are small areas of Lamson and Canandaigua soils that are wetter than this Walpole soil and are in depressions; small areas of Pompton, Riverhead, and Plainfield soils that are better drained and are on slight rises; and a few areas of Raynham soils. Also included are areas of a soil that is similar to the Walpole soil but has slightly acid or neutral, medium textured and moderately fine textured layers in the substratum below a depth of 40 inches.

This soil has a seasonal high water table that rises to within 6 to 18 inches of the surface in winter, in spring, and in other excessively wet periods. Depth of rooting is strongly influenced by the water table. Roots are confined mainly to the upper 15 to 24 inches of the soil. Available water capacity of this zone is low to moderate. Droughtiness is rarely a concern in drained areas. Permeability is moderately rapid in the surface layer and subsoil and is rapid in the substratum. Runoff is slow. In unlimed areas, reaction is very strongly acid to medium acid throughout the soil.

Most of the acreage of this soil is used for woodland, hay, or pasture. This soil has fair potential for farming, and it has limited potential for urban and recreational uses because of wetness.

Unless this soil is drained, it is suited to limited cultivation and to pasture or hay. Where it is drained and under

good management, it is suited to cultivated crops. Keeping soil compaction to a minimum and maintaining desirable forage stands are difficult in undrained areas that are used for hay and pasture. Planting is delayed and the choice of crops is limited in these undrained areas. A combination of surface and subsurface drains are needed in many areas. Drainage outlets are difficult to locate in places. Special measures, such as using graded sand and gravel filters or prefabricated filter materials, are needed to prevent subsurface drains from plugging with sand, which flows readily when the soil is saturated. Applied lime and fertilizer are leached from this soil at a moderately rapid rate; consequently, response is generally better to smaller but more frequent or timely applications than to one large application. Minimum tillage, incorporating crop residue into the soil, crop rotation, use of cover crops, and tilling and harvesting at the proper moisture condition are important in management.

Drained areas of this soil have fair potential for fruit crops, and only a very small acreage is used for these crops. Rootstalk that can tolerate wetness need to be used when establishing new orchards and vineyards. Soil compaction is a continuous hazard because spraying operations are often performed during wet periods. Artificial drainage, maintaining good sod, and use of lighter machinery with wider tire treads or use of specially designed machinery help prevent soil compaction.

Undrained areas of this soil are suited to woodland and to wildlife habitat. Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil. Wetness limits the suitability of this soil for some species.

The seasonal high water table is a limitation for most urban and recreational uses. This soil is better suited to dwellings without basements than to those with basements. Many homes have wet basements. Foundation drains and exterior coatings on walls of basements help prevent wetness in basements. Specially designed septic tank absorption fields are needed. Sloughing is a hazard in excavations in this soil. Roads need artificial drainage and a thick subbase. Capability subclass IIIw.

Wb—Wayland silt loam. This deep, nearly level, poorly drained soil formed in alluvium. It is on flood plains and is subject to flooding. In narrow valleys this soil adjoins the stream, but in wider valleys it is in low areas away from the stream. Slope is mainly less than 1 percent. Areas are long and narrow in shape and are 5 to 40 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The next layer is mottled, dark grayish brown silt loam 7 inches thick. The subsoil extends to a depth of about 26 inches. It is slightly sticky and plastic, mottled, olive gray light silty clay loam. The substratum to a depth of about 50 inches is mottled, gray silt loam.

Included with this soil in mapping are narrow strips of Middlebury, Teel, and Basher soils that are drier than this Wayland soil and are in slightly higher areas; small spots of soils that have a surface layer of mucky silt loam; and some areas of soils that are in the small stream valleys and have a surface layer of gravelly silt loam. Also included are narrow strips of Canandaigua and Madalin soils along drainageways.

This soil is frequently flooded for long periods. Flooding may occur at any time of the year, but it commonly occurs late in fall, in winter, and in spring. During this and other excessively wet periods a seasonal high water table is at or near the surface. Depth of rooting is limited by the water table, and roots are confined mainly to the upper 14 to 20 inches of the soil. Available water capacity of this zone is low to moderate. Permeability is moderately slow or moderate in the surface layer and is slow in the subsoil and substratum. Runoff is very slow. Reaction generally increases with depth and ranges from strongly acid to neutral in the surface layer and from strongly acid to mildly alkaline in the subsoil.

This soil is used for crops, pasture, woodland, and wildlife habitat. It has fair potential for farming and poor potential for community and recreational developments. It has potential for wetland wildlife habitat.

This soil is suited to crops and pasture. Row crops are not highly productive unless drainage is improved. A combination of surface and subsurface drains are needed. Drainage outlets are difficult to locate because of the low position of this soil on the landscape. Keeping soil compaction to a minimum and maintaining desirable forage stands are difficult in undrained areas that are used for hay and pasture. Planting is delayed and the choice of crops is limited in these undrained areas. Keeping the soil from crusting after rains and maintaining tilth, a high level of fertility, and content of organic matter are very important. Standard management practices, for example, minimum tillage, incorporating crop residue into the soil, crop rotation, use of cover crops, and tilling and harvesting at the proper moisture condition, are important in management.

Undrained areas of this soil are suited to woodland and to wildlife habitat. Woodland productivity is moderate. Machine planting of tree seedlings is practical during the drier part of the growing season. Species that are tolerant of wetness need to be selected for reforestation.

This soil is generally not used for urban and recreational developments because of the flooding hazard, slow permeability, and prolonged wetness. These limitations are very difficult to overcome. Capability subclass IIIw.

Wc—Wayland mucky silt loam. This deep, nearly level, very poorly drained soil formed in alluvium. It is in the lowest areas on first bottoms or in old oxbows or on flood plains. This soil is subject to frequent flooding and is ponded after the floodwater recedes. Slope is mainly

less than 1 percent. Areas are generally long and narrow in shape and are 5 to 30 acres in size.

Typically, the surface layer is mottled, black mucky silty loam about 5 inches thick. The next layer is mottled, dark gray silt loam 7 inches thick. The subsoil extends to a depth of 24 inches. It is slightly sticky and plastic, mottled, olive gray light silty clay loam. The substratum to a depth of about 50 inches is mottled, gray silt loam.

Included with this soil in mapping are a few narrow strips of Madalin and Canandaigua soils in old oxbows on stream terraces. Also included are small areas of soils that have a surface layer of silt loam and silty clay loam; narrow strips of Teel and Middlebury soils that are drier than this Wayland soil and in slightly higher areas; and small areas of Palms soils that are in depressions.

This soil is frequently flooded for long periods. Flooding may occur at any time of the year, but it commonly occurs late in fall, in winter, and in spring. During this and other excessively wet periods a seasonal high water table is at or near the surface. Depth of rooting is limited by the water table, and roots are confined mainly to the upper 10 to 15 inches of the soil. Available water capacity of this zone is low to moderate. Permeability is moderately slow or moderate in the surface layer and is slow in the subsoil and substratum. Runoff is very slow. Reaction generally increases with depth and is strongly acid to neutral in the surface layer and strongly acid to mildly alkaline in the subsoil.

This soil is not used intensively. Most of the acreage is used for woodland and for wetland wildlife habitat. This soil has poor to fair potential for farming, but it has poor potential for community and recreational developments. It has good potential for wetland wildlife habitat.

Unless this soil is drained, it is too wet for cultivated crops. If it is adequately drained, it is suited to cultivated crops, hay, and pasture. Wetness is the main concern in management. Most areas are difficult to drain because of their low position on the landscape. A combination of surface and subsurface drains is needed. Keeping the soil from crusting after rains and maintaining tilth and a high level of fertility are very important. Standard management practices, for example, minimum tillage, incorporating crop residue into the soil, crop rotation, use of cover crops, and tilling and harvesting at the proper moisture condition, are also important.

Undrained areas of this soil are suited to woodland and to wetland wildlife habitat. Woodland productivity is moderate. Machine planting of tree seedlings is not practical, except during the drier part of the growing season.

This soil generally is not used for urban and recreational uses because of the flooding hazard, slow permeability, and prolonged wetness. These limitations are very difficult to overcome. Some areas are suitable for wildlife marshes. Capability subclass IVw.

WeB—Wellsboro flaggy silt loam, 3 to 8 percent slopes. This deep, gently sloping, moderately well drained soil formed in glacial till. It is on glaciated uplands. Slopes are slightly convex and uniform. Most areas are irregular in shape and are 5 to 40 acres in size.

Typically, the surface layer is dark brown flaggy silt loam about 9 inches thick. The upper part of the subsoil extends to a depth of about 18 inches. It is friable, reddish brown flaggy silt loam and has mottles below a depth of 15 inches. A firm, leached layer of mottled, pale brown gravelly loam about 3 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil extends to a depth of 50 inches. It is a firm and brittle, mottled, reddish brown gravelly loam fragipan. The substratum is mottled, reddish brown gravelly loam that extends to a depth of about 60 inches.

Included with this soil in mapping are small areas of Morris and Menlo soils that are wetter than this Wellsboro soil and are in slight depressions and along drainageways. Also included are areas of well drained Lackawanna soils that are on hilltops and small areas of Oquaga soils that have bedrock at a depth of 20 to 40 inches.

Late in fall, in winter, and early in spring a temporary seasonal high water is perched above the slowly permeable fragipan and substratum. Roots are confined to the 15 to 25 inches of soil above the fragipan. Available water capacity of this zone is low to moderate. Permeability is moderate above the fragipan and is slow in the fragipan and substratum. Runoff is medium. In unlimed areas, reaction is very strongly acid to medium acid thoughout the soil.

Most of the acreage of this soil is used for hay and pasture. This soil has good potential for farming, but it has limited potential for community developments.

This soil is suited to crops and pasture. Seasonal wetness delays planting for short periods. Random subsurface drains are needed in the wetter included soils so crops can be planted early in spring. Drainage of areas on foot slopes can be improved by diverting surface water that would commonly flow over this soil from higher adjacent areas. Diversion terraces and such practices as contour farming, use of cover crops, crop rotation, incorporating crop residue into the soil, and minimum tillage, help to control erosion, improve tilth, and maintain the content of organic matter. Crops respond well to liming and fertilization. Small, flat stones hinder tillage and cause excessive wear of machinery.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

The seasonal high water table and slow permeability in the fragipan and substratum are limitations for many urban uses. Effluent from many septic tank absorption fields seeps to the surface in this soil. Because of slow permeability in the fragipan and substratum, absorption fields need to be much larger than those commonly installed. Foundation drains and protective coatings on exterior walls of basements are needed. This soil has

potential for recreational uses even though small stones, slow permeability, and wetness are limitations for many of these uses. Capability subclass IIe.

WeC—Wellsboro flaggy silt loam, 8 to 15 percent slopes. This deep, sloping, moderately well drained soil formed in glacial till. It is on glaciated uplands. Slopes are convex and smooth. Most areas are oblong in shape and are 10 to 30 acres in size.

Typically, the surface layer is dark brown flaggy silt loam about 9 inches thick. The subsoil extends to a depth of about 50 inches. The upper 7 inches of the subsoil is friable, yellowish red flaggy silt loam; the next 5 inches is firm, mottled, brown gravelly loam; and the lower 29 inches is a firm and brittle, mottled, reddish brown gravelly loam fragipan. The substratum to a depth of 60 inches is mottled, reddish brown gravelly loam.

Included with this soil in mapping are small areas of well drained Lackawanna soils that are on hillcrests; areas of Morris soils that are wetter than this Wellsboro soil and are in seeps and on foot slopes; and narrow strips of Oquaga soils that have bedrock at a depth of 20 to 40 inches. Also included are some spots of eroded soils.

Late in fall, in winter, and early in spring a temporary seasonal high water table is perched above the slowly permeable fragipan and substratum. Roots are confined to the 15 to 25 inches of soil above the fragipan. Available water capacity of this zone is low to moderate. Permeability is moderate above the fragipan and is slow in the fragipan and substratum. Runoff is rapid. In unlimed areas, reaction is very strongly acid to medium acid throughout the soil.

Most of the acreage of this soil is used for hay, pasture, and woodland. This soil has fair potential for farming, but it has limited potential for community developments.

This soil is suited to crops and pasture. It is somewhat limited, however, because slope causes some difficulty in farming operations. If this soil is intensively used for intertilled crops, erosion is a major hazard. If proper management and conservation measures are used, crops can be grown. Sod-forming crops are needed in the cropping system a large proportion of the time. Standard management practices, for example, contour farming, minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture condition, and crop rotation, help to control erosion, improve tilth, and maintain the content of organic matter. Crops respond well to liming and fertilization. Seasonal wetness delays planting for short periods. Small, flat stones hinder tillage and cause excessive wear of machinery.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

Because of the seasonal high water table and slow permeability in the fragipan and substratum, this soil has limitations for many urban uses. This soil is better suited to dwellings without basements than to those with basements. Foundation drains and protective coatings on exterior walls of basements are needed. Effluent from many septic tank absorption fields seeps to the surface in this soil. Effluent fields need to be much larger than those commonly installed because of slow permeability in the fragipan and substratum. This soil has potential for recreational uses even though small stones, slope, slow permeability, and wetness are limitations for many of these uses. Capability subclass IIIe.

WLB—Wellsboro and Wurtsboro very bouldery soils, gently sloping. This map unit consists of deep, moderately well drained soils that are on glaciated uplands. These very bouldery soils formed in glacial till. Slope ranges from 3 to 8 percent and is mainly long and smooth. Areas are generally irregular in shape and are 10 to 400 acres in size.

These soils are rarely in the same area. Most areas are made up only of Wellsboro very bouldery soils or of Wurtsboro very bouldery soils. Wellsboro soils are mainly in the Catskill Mountains, and Wurtsboro soils are in the Shawangunk Mountains and on the plateau adjacent to the Catskill Mountains.

Typically, the surface layer of the Wellsboro soils is dark brown very bouldery silt loam about 9 inches thick. The subsoil extends to a depth of about 50 inches. The upper 7 inches of the subsoil is friable, yellowish red flaggy silt loam; the next 5 inches is firm, mottled, brown gravelly loam; and the lower 29 inches is a firm and brittle, mottled, reddish brown gravelly loam fragipan.

Typically, the surface layer of the Wurtsboro soil is brown very bouldery loam about 6 inches thick. The upper part of the subsoil extends to a depth of 12 inches. It is friable, yellowish brown gravelly sandy loam. A mottled, leached layer of friable, brown gravelly sandy loam about 7 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil to a depth of 56 inches is a very firm and brittle fragipan. It is mottled, dark yellowish brown gravelly fine sandy loam above a depth of 36 inches and dark brown gravelly loam below that.

Included with these soils in mapping are areas of Morris, Scriba, and Menlo soils in seeps, depressions, and wet areas along small drainageways; a few areas of Bath and Mardin soils on the plateau adjacent to the Catskill Mountains and on the foot slopes of the Shawangunk Mountains; and Swartswood and Lackawanna soils on knolls and hilltops. Also included are small spots of Lordstown, Oquaga, and Valois soils. Most included areas have slopes of 2 and 3 percent and 8 to 15 percent. A few small areas are nonbouldery, and a few are extremely bouldery.

Late in fall, in winter, and early in spring a temporary seasonal high water table is perched above the slowly permeable fragipan and substratum. Because the fragi-

pan is so dense, roots cannot easily penetrate it, and so they are mostly confined to the 15- to 28-inch zone above the fragipan. Available water capacity of this zone is low to moderate in the Wellsboro soils and is low in the Wurtsboro soils. Permeability is moderate above the fragipan and is slow in the fragipan and substratum in both soils. Runoff is medium. Boulders are dominantly 1 to 4 feet thick and 2 to 10 feet across, but some are smaller and a few are larger. They cover 0.1 to 3 percent of the surface of these soils and are spaced about 5 to 30 feet apart. In unlimed areas, reaction is very strongly acid to medium acid in the Wellsboro soils and extremely acid to medium acid in the Wurtsboro soils.

Most of the acreage of these soils is used for woodland and for wildlife habitat to which they are well suited. These soils have poor potential for farming and for urban uses.

Some areas of these soils are used for hay and permanent pasture, but the boulders are severe limitations to large machines in fertilizing and mowing. Surface boulders must be removed before the soils can be cultivated. After the boulders are removed, these soils can be farmed. Crops respond well to liming and fertilization. Seasonal wetness delays planting for short periods. Drainage of areas on foot slopes can be improved by diverting the surface water from higher adjacent areas. Diversion terraces, contour farming, crop rotation, use of cover crops, and minimum tillage, help to control erosion, improve tilth, and maintain the content of organic matter.

Woodland productivity is moderately high. The boulders present difficulty in machine planting of tree seedlings. Logging roads and skid trails need to be well laid out and need drainage dips or water bars to protect them from erosion.

Boulders, wetness, and slow permeability in the fragipan and substratum are limitations for urban and recreational uses. Effluent from many septic tank absorption fields seeps to the surface in these soils. Because of slow permeability in the fragipan and substratum, absorption fields need to be much larger than those commonly installed. Foundation drains and protective coatings on exterior walls of basements are needed. Some areas have potential for such recreational uses as picnic areas and paths and trails. Capability subclass VIs.

WOB—Wellsboro and Wurtsboro extremely bouldery soils, gently sloping. This map unit consists of deep, moderately well drained soils that are below rock ledges in glaciated uplands. These extremely bouldery soils formed in glacial till. Slope ranges from 3 to 8 percent and is mainly smooth. Areas are generally irregular in shape and are 10 to 75 acres in size.

Most areas consist entirely of Wellsboro extremely bouldery soils or of Wurtsboro extremely bouldery soils. A few areas consist of both soils. Boulders dominate the capabilities of this unit so much that the difference between the Wellsboro soils and the Wurtsboro soils is relatively unimportant. Wellsboro soils are mainly in the Catskill Mountains, and Wurtsboro soils are in the Shawangunk Mountains and on the plateau adjacent to the Catskill Mountains.

Typically, the surface layer of the Wellsboro soil is very dark grayish brown extremely bouldery silt loam about 4 inches thick. The subsurface layer is leached, brown flaggy silt loam 3 inches thick. The upper part of the subsoil extends to a depth of about 21 inches. It is friable, reddish brown flaggy silt loam and has mottles below a depth of about 16 inches. The lower part of the subsoil is a firm and brittle, mottled, reddish brown gravelly loam fragipan that extends to a depth of about 48 inches. The substratum is mottled, reddish brown gravelly loam that extends to a depth of about 60 inches.

Typically, the surface layer of the Wurtsboro soil is very dark grayish brown extremely bouldery loam about 4 inches thick. The subsurface layer is leached, grayish brown gravelly loam 2 inches thick. The upper part of the subsoil extends to a depth of about 12 inches. It is friable, yellowish brown gravelly sandy loam. A friable, mottled, leached layer of brown gravelly sandy loam separates the upper part of the subsoil from the lower part. The lower part of the subsoil to a depth of about 56 inches is a very firm and brittle fragipan. It is mottled, dark yellowish brown gravelly fine sandy loam above a depth of about 36 inches and dark brown gravelly loam below that.

Included with these soils in mapping are some fairly large areas of well drained Valois soils that do not have a slowly permeable fragipan; areas of Morris, Scriba, and Menlo soils that are wetter than these Wellsboro and Wurtsboro soils and are in seeps and depressions and along small drainageways; and a few areas of extremely bouldery Mardin soils that are in the eastern part of the county Also included are narrow strips of Lordstown and Oquaga soils that have bedrock at a depth of 20 to 40 inches; small areas of Lackawanna and Swartswood soils that are on knolls and the upper part of slopes; and some spots that are very bouldery or are rubble land. Most included areas have slopes of 2 and 3 percent and 8 to 15 percent.

Late in fall, in winter, and early in spring a temporary seasonal high water table is perched above the slowly permeable fragipan and substratum. Because the fragipan is so dense, roots cannot easily penetrate it, so they are mostly confined to the 15- to 28-inch zone above the fragipan. Available water capacity of this zone is low to moderate in the Wellsboro soils and is low in the Wurtsboro soils. Permeability is moderate above the fragipan and is slow in the fragipan and substratum of both soils. Runoff is medium. Boulders cover 3 to 15 percent of the surface of these soils. They are dominantly 2 to 4 feet thick and 2 to 10 feet across, but some are smaller and a few are larger. They are spaced about 2.5 to 5 feet apart in most areas. The subsoil and substratum general-

ly contain considerably less boulders than the surface layer contains. In unlimed areas, reaction is very strongly acid to medium acid in the Wellsboro soils and extremely acid to medium acid in the Wurtsboro soils.

Most of the acreage of these soils is used for woodland and for wildlife habitat to which they are best suited. These soils have poor potential for farming and for urban and recreational uses.

Woodland productivity is moderately high. Surface boulders limit the use of large machines in logging. Woodland plantings are extremely difficult. Logging roads and skid trails need to be well laid out and need drainage dips or water bars to protect them from erosion.

Boulders cause difficulty in construction for urban developments. Wetness and slow permeability are limitations for community developments and recreational uses. Foundation drains and protective coatings on exterior walls of basements are needed. Care should be taken when hiking on these extremely bouldery soils. Capability subclass VIIs.

WsA—Williamson silt loam, 0 to 3 percent slopes. This deep, nearly level, moderately well drained soil formed in wind- or water-deposited silt, very fine sand, and some clay. It is on lake plains and uplands. Most areas are oblong or long and narrow in shape and are 5 to 20 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil extends to a depth of about 18 inches. It is friable, strong brown silt loam and has mottles below a depth of 14 inches. The lower part of the subsoil is a firm, mottled, brown silt loam and very fine sandy loam fragipan that extends to a depth of about 42 inches. The substratum to a depth of about 52 inches is layered yellowish brown silt loam and reddish brown silty clay loam, dominantly silt loam.

Included with this soil in mapping are narrow strips of Raynham and Canandaigua soils that are wetter than this Williamson soil and are in low areas and along drainageways; small areas of Unadilla and Riverhead soils that are drier and are on low knolls; some areas of moderately well drained, silty Scio soils, which do not have a fragipan; and a few small areas of Hudson, Cayuga, and Schoharie soils that have a finer textured subsoil than this Williamson soil and are on lake plains. Also included are areas of a soil that is similar to the Williamson soil on uplands but has glacial till in the substratum below a depth of 40 inches and small areas of Pompton soils that are between Kingston and Saugerties.

Late in winter, in spring, and in other excessively wet periods, this soil has a seasonal high water table within a depth of 18 to 24 inches. This water table is perched on the slowly permeable fragipan and substratum. Maximum rooting depth is influenced by the depth to the fragipan, and is mainly 15 to 24 inches. Available water capacity in the root zone is moderate. Permeability is moderate in the surface layer and upper part of the subsoil. The surface crusts easily when the soil is intensively cultivated. Runoff is slow. In unlimed areas, reaction is very strongly acid to medium acid in the surface layer, is very strongly acid to slightly acid in the upper part of the subsoil, and is strongly acid or medium acid in the fragipan.

Most of the acreage of this soil is used for crops, hay, and pasture. Some areas are idle. This soil has good potential for farming. Urban uses are limited by seasonal wetness and slow permeability in the fragipan. This soil has potential for some recreational uses.

This stone-free, silty soil is suited to cultivated crops, special crops, hay, and pasture. Wetness delays planting in some seasons. Artificial drainage is needed in areas of the wetter included soils. Keeping the soil from crusting after rain and maintaining tilth and a high level of fertility are also main management concerns. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, crop rotation, and tilling and harvesting at the proper moisture condition, help to improve tilth and maintain the content of organic matter. Soil compaction is a concern in areas where this soil is used for special crops because harvesting is commonly performed during wet periods. Use of lighter machinery with wider tire treads or use of specially designed machinery helps to prevent soil compaction.

Fruit crops are moderately suited to this soil. Soil compaction is a continuous concern because spraying operations by heavy equipment are commonly performed during wet periods. Artificial drainage, maintaining good sod, and use of lighter machinery with wider tire treads or use of specially designed machinery help prevent this problem.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

Because of the seasonal high water table and slow permeability in the fragipan and substratum, this soil has limitations for many urban uses. This soil has potential for such recreational uses as picnic areas and paths and trails. This soil is better suited to dwellings without basements than to those with basements. Foundation drains and protective coatings on the exterior walls of basements are needed. Roads need artificial drainage. The subbase of roads needs to be thicker than that commonly used. Capability subclass IIw.

WsB—Williamson silt loam, 3 to 8 percent slopes. This deep, gently sloping, moderately well drained soil formed in wind- or water-deposited silt, very fine sand, and some clay. It is on lake plains and uplands. Slopes are slightly convex. Areas vary in shape and are 5 to 60 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil extends to a depth of about 18 inches. It is friable, strong brown silt

loam and has mottles below a depth of 14 inches. The lower part of the subsoil is a firm, mottled, brown silt loam and very fine sandy loam fragipan that extends to a depth of about 42 inches. The substratum to a depth of about 52 inches is layered yellowish brown silt loam and reddish brown silty clay loam, dominantly silt loam.

Included with this soil in mapping are narrow strips of somewhat poorly drained Raynham soils that are in slight depressions and on foot slopes; some small areas of Hudson, Cayuga, and Schoharie soils that have a finer textured subsoil than this Williamson soil and are on lake plains; a few areas of Unadilla and Riverhead soils that are drier and are on knolls; and a few areas of Scio and Pompton soils, which do not have a fragipan. Also included are small areas on uplands of a soil that is similar to the Williamson soil but has glacial till in the substratum below a depth of 40 inches.

Late in winter, in spring, and in other excessively wet periods, this soil has a seasonal high water table within a depth of 18 to 24 inches. This water table is perched on the slowly permeable fragipan and substratum. Maximum rooting depth is influenced by the depth to the fragipan and is mainly 15 to 24 inches. Available water capacity in the root zone is moderate. Permeability is moderate in the surface layer and upper part of the subsoil. The surface crusts easily when the soil is intensively cultivated. Runoff is medium. In unlimed areas, reaction is very strongly acid to medium acid in the surface layer, is very strongly acid to slightly acid in the upper part of the subsoil, and is strongly acid or medium acid in the fragipan.

Most of the acreage of this soil is used for crops, hay, and pasture. This soil has good potential for farming. Seasonal wetness and slow permeability in the fragipan are limitations for urban uses. This soil has potential for some recreational uses.

This stone-free, silty soil is suited to cultivated crops, special crops, hay, and pasture. Seasonal wetness delays planting in some seasons. Artificial drainage is needed in areas of the wetter included soils. The hazard of erosion is severe in cultivated areas that are unprotected. Keeping the soil from crusting after rain and maintaining tilth and a high level of fertility are also main management concerns. Standard management practices, for example, minimum tillage, use of cover crops, incorporating crop residue into the soil, crop rotation, and tilling and harvesting at the proper moisture condition, help to control erosion, improve tilth, and maintain the content of organic matter. Soil compaction is a concern in areas where this soil is used for special crops because harvesting is commonly performed during wet periods. Use of lighter machinery with wider tire treads or use of special machinery helps prevent soil compaction.

Fruit crops are moderately suited to this soil. Soil compaction is a continuous concern because spraying operations are commonly performed with heavy equipment during wet periods. Artificial drainage, maintaining good sod, and use of lighter machinery with wider tire treads or use of special machinery help prevent soil compaction.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

The seasonal high water table and slow permeability in the fragipan and substratum are limitations for many urban uses. This soil has potential for such recreational uses as picnic areas and paths and trails. It is better suited to dwellings without basements than to those with basements. Foundation drains and exterior coatings on walls of basements are needed. Streets and parking lots need artificial drainage. The subbase of roads needs to be thicker than that commonly used. Capability subclass IIe.

WuB—Wurtsboro stony loam, 3 to 8 percent slopes. This deep, stony, gently sloping, moderately well drained soil formed in glacial till on uplands. Slopes are smooth and slightly convex. Most areas are irregular in shape and are 5 to 30 acres in size.

Typically, the surface layer is brown gravelly loam about 6 inches thick. The upper part of the subsoil extends to a depth of 12 inches. It is friable, yellowish brown gravelly sandy loam. A friable, mottled, leached layer of brown gravelly sandy loam 7 inches thick separates the upper part of the subsoil from the lower part. The lower part of the subsoil to a depth of about 56 inches is a very firm and brittle fragipan. It is mottled, dark yellowish brown gravelly fine sandy loam above a depth of 36 inches and dark brown gravelly loam below that.

Included with this soil in mapping are small areas of Scriba and Menlo soils in slight depressions and along drainageways. These wetter soils make up as much as 15 percent of some areas. Also included are Swartswood soils on low knolls and hilltops and small areas of Lordstown soils that have bedrock at a depth of 20 to 40 inches.

Late in fall, in winter, and early in spring a temporary seasonal high water table is perched above the slowly permeable fragipan and substratum. Roots are confined to the 17 to 28 inches of soil above the fragipan. Available water capacity of this zone is low. Permeability is moderate above the fragipan and is slow in the fragipan and substratum. Runoff is medium. Approximately 0.01 to 0.1 percent of the surface is covered with large flat stones about 1 foot thick and 1 to 5 feet across. Stones are spaced about 30 to 100 feet apart. In unlimed areas, reaction is very strongly acid to medium acid throughout the soil.

Most of the acreage of this soil is used for pasture, long-term hay, and woodland. Many areas that are presently cropland are reverting to woodland. This soil has good potential for farming, but it has limited potential for community developments.

Tillage of crops by large machinery is not practical because of large stones on the surface. After stones are removed, this soil is suited to crops and pasture. Crops respond well to simple practices, such as liming and fertilization. Planting is delayed early in spring for short periods. Drainage of areas on foot slopes can be improved by diverting the surface water from higher adjacent areas. Diversion terraces, contour farming, cover crops, crop rotation, minimum tillage, and incorporating crop residue into the soil, help to control erosion, improve tilth, and maintain the content of organic matter.

Woodland productivity is moderately high. Machine planting of tree seedlings is practical on this soil.

The seasonal high water table and slow permeability in the fragipan and substratum are limitations for many urban uses. This soil is better suited to dwellings without basements than to those with basements. Foundation drains and protective coatings on the exterior walls of basements are needed. Effluent from many septic tank absorption fields seeps to the surface in this soil. Because of the slow permeability in the fragipan and substratum, absorption fields need to be much larger than those commonly installed. This soil has potential for recreational uses even though small stones, slow permeability, and wetness are limitations for many of these uses. Capability subclass IIe.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, rangeland, and woodland, as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities, and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

William H. Palmer and Harold J. Hogan, cooperative extension agents; Warren H. Smith, fruit specialist, Cooperative Extension Service; David M. Squires, county executive director, Agricultural Stabilization and Conservation Service; and George A. Sisco, district conservationist, Soil Conservation Service, helped to prepare this section.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

General principles of soil management

In 1969, 54,448 acres in Ulster County was used for crops and pasture (*12*). Of this total, 27,404 acres was used for cropland other than orchards, 14,947 acres for orchards and vineyards, and 12,097 acres for pasture. Potential is excellent for increased crop production in certain sections of the county, but it is very poor in other sections. Crop production on many soils, especially those that have moderate potential, can be increased

considerably through the application of appropriate conservation practices and the use of latest crop production technology. This survey can help facilitate the application of conservation practices and the use of new technology.

The acreage in crops and pasture has gradually been decreasing because more land is used for urban development or for speculation, or has soil limitations that are too costly to overcome in farming. The use of this survey to help make land use decisions that will influence farming is discussed in the section "Soil maps for detailed planning."

Some general principles of soil management related to crop production in the survey area are discussed on the following pages.

Soil erosion is a major concern on about half of the cropland in Ulster County (*9*). The hazard of erosion is related to slope of the land, erodibility of the soil, rainfall, and amount and type of vegetative cover.

The loss of soil through erosion is damaging for several reasons. Erosion causes loss of nutrients and water, formation of gullies on hillsides, deterioration of soil tilth, detrimental sedimentation downslope, and pollution of streams and water reservoirs. Soil productivity generally is reduced as the surface layer is lost, and increasing amounts of the subsoil are incorporated into the plow layer. This is especially true of soils that have a fine textured or moderately fine textured subsoil, such as Hudson and Schoharie soils, and soils that have a compact subsoil that restricts the depth of rooting, such as Mardin and Lackawanna soils. Erosion also reduces productivity on soils that tend to be droughty, such as Plainfield and Chenango soils through the loss of organic matter. Soils that are shallow or moderately deep to bedrock, such as Arnot, Nassau, and Lordstown soils, are permanently damaged by erosion.

Erosion control practices provide protective cover, reduce runoff, and increase infiltration. Many tillage and conservation practices aid in erosion control. Minimum tillage, no-tillage, cover crops, leaving crop residue on the surface, and a high proportion of sod-forming crops in the cropping system are suitable management practices on soils that have short, irregular slopes, such as rolling Hoosic and Tunkhannock soils. Practices, such as contour farming, stripcropping, terracing, and constructing diversions, are more suitable on soils that have smooth, long, uniform slopes such as the sloping Bath, Cambridge, Swartswood, and Wellsboro soils.

Most soils that have slopes of more than 3 percent require some type of measures to control water erosion. Soils that are high in silt and low in coarse fragments, such as Williamson, Unadilla, and Hudson soils, are the most susceptible to erosion.

Soil blowing is a concern on some soils, such as the sandy Plainfield soils and cleared areas of the organic Carlisle and Palms soils, especially when the surface is dry. Windbreaks, regulating the water table, and irrigation are effective in reducing soil blowing.

The effectiveness of a particular combination of conservation practices differs from one soil to another; also, different combinations can be equally effective on the same soil. The local representative of the Soil Conservation Service is available to assist in planning an effective combination of practices to reduce erosion.

Soil drainage is a major management need on about one-third of the acreage used for crops and pasture in the survey area. Some soils are so wet that the production of crops common to the area generally is not possible without the installation of extensive drainage systems. These are, for example, the poorly drained and very poorly drained Atherton, Canandaigua, Carlisle, Lamson, Lyons, Madalin, Menlo, Palms, Tuller, and Wayland soils.

Seasonal wetness interferes with early planting, growth, and harvesting of most crops on the somewhat poorly drained soils. In this category are the Churchville, Morris, Odessa, Raynham, Red Hook, Rhinebeck, Scriba, and Volusia soils. Crops grown on these soils respond well to improved drainage. Crop production on the drained soils is commonly as high as production on soils that are naturally better drained.

Some well drained and moderately well drained soils, such as Bath, Valois, Riverhead, and Mardin soils, contain small inclusions of wetter soils that require random subsurface drainage to make management of fields more uniform.

The design of drainage systems varies with the kind of soil. A combination of surface drainage and subsurface drainage is needed in most areas of poorly drained and very poorly drained soils. Establishing drainage outlets in these soils can be difficult and expensive. Surface drainage can include such practices as constructing open ditches and grassed waterways, land smoothing, and using a bedding system. Subsurface drainage mainly consists of tile or plastic drains.

Drains must be more closely spaced in soils that have slow permeability than in more permeable soils. Subsurface drainage is slow in Churchville, Madalin, Odessa, Rhinebeck, Scriba, and Volusia soils. These soils also require surface drainage in places. Soils that have rapid permeability, such as Red Hook and Atherton soils, respond well to subsurface drainage if adequate outlets are available. Some wet, sloping soils respond well to interceptor drains that divert surface runoff and subsurface seepage away from the area. The sloping Volusia and Scriba soils are examples.

Information on drainage design and costs is available at the Ulster County Soil and Water Conservation District Office.

Surface stones, boulders, and rock outcrops severely limit the use of the soils for cropland and pasture in many areas of the county. These limiting features interfere with the use of modern agricultural machinery.

Some areas of very stony and very bouldery soils can only be used for hay and permanent pasture. Even then fertilizing, reseeding, and mowing are difficult. Examples are the very stony and sloping phases of Bath and Mardin soils and very bouldery and gently sloping Scriba and Morris soils. Extremely bouldery phases such as in Wellsboro and Wurtsboro soils are too bouldery for farming uses.

Map units, such as Bath-Nassau-Rock outcrop complex, hilly, where more than 10 percent of the surface is occupied by rock outcrops are generally unsuited to cultivation. Use is largely limited to pasture, to orchards maintained in permanent sod, and to woodland and wildlife habitat. Map units that have more than 40 percent rock outcrop cannot be used for commercial crop production.

Removal of the larger stones and boulders from soils that have few limitations can be feasible in places. Limitations of rock outcrops in soils generally are not feasible to overcome.

Available water capacity is important in growing crops. Some soils in the county tend to be droughty. Sandy and gravelly soils, soils that have a restricting layer such as a fragipan, soils that are shallow or moderately deep to bedrock, and soils that have an excessive amount of coarse fragments tend to have relatively low capacity to store moisture. The gravelly Hoosic soils, sandy Plainfield soils, Scriba soils that have a fragipan, extremely bouldery Wurtsboro soils, and shallow Nassau soils have low available water capacity. Maintaining or increasing the content of organic matter and improving soil structure help increase the available water capacity of these droughty soils. Use of green manure crops, return of crop residue, and addition of animal wastes are practices that build up organic matter levels and improve soil structure.

Soil tilth is important in the emergence of seedlings, the infiltration of water into the soil, and the ease of cultivation. Soils that have good tilth generally have granular structure and are porous.

Tillage practices have a strong influence on soil tilth. Excessive tillage tends to reduce organic matter content and to break down soil structure. Some soils that are deep, well drained or excessively drained, and coarse textured or moderately coarse textured, such as Plainfield and Hoosic soils, can be tilled with little concern for damaging soil tilth. However, wetter and finer textured soils, such as Hudson, Rhinebeck, and Odessa soils, must be tilled at the proper moisture condition to prevent deterioration of the natural soil structure. Plowing or cultivating when these kinds of soils are wet causes puddling and results in hard surface crusts and clods when the soils dry. Cultivation at proper moisture condition, inclusion of sod crops, green manure crops, and cover crops in the crop rotation, return of crop residue, and addition of animal manure help keep the soil granular and porous and in good tilth.

Soil fertility is critical in crop production. All of the soils in the county need lime or fertilizer, or both, for optimum crop production. The amounts needed depend on the natural content of lime and plant nutrients in the soil, on the needs of the particular crop, and on the level of yield desired.

Organic matter content is important in assessing soil fertility. The average organic matter content is about 3.5 percent in the surface layer of the soils in Ulster County. Poorly drained and very poorly drained soils, such as Madalin and Lyons soils, generally have a somewhat higher content of organic matter. Nitrogen in the organic matter is in complex organic forms and is unusable by plants until the organic matter is slowly decomposed by soil micro-organisms. It is necessary to apply nitrogen fertilizer to supplement the nitrogen made available from the organic matter. Management practices that tend to build up organic matter levels, such as use of green manure crops and sod crops and return of crop residue, help to improve the natural nitrogen content.

Timeliness of nitrogen fertilization is important for maximum use by plants. Nitrogen can be lost by either leaching from rapidly permeable soils such as Hoosic soils, or by denitrification on the wetter and less permeable soils, such as Schoharie soils. Small amounts of nitrogen applied at timely intervals, such as at planting and as side dressings while the crop is growing, can give the best results.

Soils of Ulster County generally are low in natural phosphorus. Coarse textured soils, such as Plainfield soils, tend to be very low in natural phosphorus. The additions of appropriate amounts of phosphate in the form of commercial fertilizers is essential for good crop growth.

Most of the soils are low to medium in potassium-supplying power. However, such soils as Rhinebeck and Schoharie soils that have a clayey subsoil are somewhat higher in potassium content. Even soils with a relatively high content of potassium require additional potassium fertilizer for optimum yields of most crops.

Additions of lime and fertilizer should be based on results of soil tests. For assistance in obtaining soil tests and in the kind and amount of fertilizer to use, farmers and others should consult their local Cooperative Extension Agent. New research and fertilizer recommendations also can be found in current additions of "Cornell Recommends for Field Crops" and "Vegetable Production Recommendations", both prepared by the staff of the New York State College of Agriculture, Cornell University, Ithaca, New York. In the absence of soil tests, these references along with this publication can be used as a guide in determining lime and fertility needs.

Special crops are extensive in Ulster County. Orchards and vineyards are common in the southeastern part of the county. In 1969, 14,947 acres were in orchards in Ulster County. Common fruits are apples, grapes, pears, peaches, and plums. Soils well suited to orchards are

deep, well drained, free of impervious layers that restrict root development, moderate to high in available water capacity, and slightly acid or medium acid. Unadilla and Valois soils are examples of soils that are well suited to fruit crops. Grapes are better suited to droughty soils than orchard crops because of their deeper root penetration. Yields can be increased on most soils that have limitations through the proper selection of root stock for planting. Even though soil considerations are very important in the selection of orchard sites, locations with good air drainage are of greater importance.

Table 5 lists the estimated apple yields for the soils on which apples are commonly grown or are suited. There is a direct percentage relationship between apple yields and other orchard crop yields. The bushel yield of other fruits as a percentage of apple yields are as follows: Pears, 75 percent; peaches, 50 percent; and plums, 40 percent.

Vegetables grown commercially in the survey area consist of sweet corn. About 2,700 acres was grown in 1969. Large areas of sweet corn are grown in the Esopus, Rondant, and Wallkill valleys for fresh markets along the east coast. A small acreage of strawberries, potatoes, cabbage, tomatoes, pumpkins, and squash are also grown. Deep soils, such as Hamlin, Tioga, and Unadilla soils, that have good natural drainage and high available water capacity, are free of impervious layers and coarse fragments, and warm early in spring are especially well suited to vegetable crops. Where drainage is feasible, organic soils, such as Carlisle and Palms muck, have excellent potential for a wide range of vegetable crops.

Yields of sweet corn obtained on soils where sweet corn is commonly grown or suited are given in Table 5.

Latest information for growing orchard and vineyard crops, as well as field crops and hay, can be obtained from the Cooperative Extension Service and the Soil Conservation Service.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

The estimated yields reflect the productive capacity of the soils for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is indicated in table 6. All soils in the survey area except those named at a level higher than the series are included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability classes I and II. Data in this table can be used to determine the farming potential of such soils.

The capability subclass is identified in the description of each soil map unit in the section "Soil maps for detailed planning."

Woodland management and productivity

Meredith A. Peters, woodland conservationist, Soil Conservation Service helped to prepare this section.

Approximately 383,000 acres, or 52 percent of Ulster County, is classified as commercial forest (*10*).

The extent of commercial forest-type groups in the county are as follows: white or red pine, 47,900 acres; plantations, 14,700 acres; oak, 106,800 acres; elm-ash-red maple, 96,400 acres; and aspen-birch, 11,300 acres.

Table 7 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Mapping unit symbols for soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *d*, restricted root depth; *s*, sandy texture; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, d, s, and r.

In table 7 the soils are also rated for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and

severe, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. In table 7 site index is given for trees that woodland managers generally favor for wood crop production. They are the most important tree species on the basis of growth rate, quality, value, and marketability. Other tree species that commonly occur on the soil are also listed regardless of potential value and growth potential.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 8 shows, for each kind of soil, the degree and kind of limitations for building site development; table 9, for sanitary facilities; and table 11, for water management. Table 10 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping are indicated in table 8. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major

increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, (fig. 9) or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 8 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard (fig. 10).

Local roads and streets referred to in table 8 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Lawns and landscaping require soils that are suitable for the establishment and maintenance of turf for lawns and ornamental trees and shrubs for landscaping. The best soils are firm after rains, are not dusty when dry, and absorb water readily and hold sufficient moisture for plant growth. The surface layer should be free of stones. If shaping is required, the soils should be thick enough over bedrock or hardpan to allow for necessary grading. In rating the soils, the availability of water for sprinkling is assumed.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 9 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 9 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 10 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 14 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 10 provide

guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 14.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 11 soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 11 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

The major recreation areas in Ulster County are in the Catskill and Shawangunk Mountains. These mountains have spectacular views and offer many recreational uses. Fifty six lakes and ponds that are more than 10 acres in size are in the county. They have approximately 12,549 surface acres of water. The close proximity of the county to the major cities in the northeast offers potential for increased recreational use.

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 12 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 9, and interpretations for dwellings without basements and for local roads and streets, given in table 8.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They should have a surface that is free of stones and boulders and have moderate slopes. Suitability of the soil for traps, tees, or greens was not considered in rating the soils. Irrigation is an assumed management practice.

Wildlife habitat

Robert E. Myers, wildlife biologist, Soil Conservation Service helped to prepare this section.

Wildlife is an important resource in Ulster County. The intensively cropped valley floors provide habitat for ring-necked pheasants, but it is generally of low quality. The rolling land and patches of woodland, brush, idle fields, and interspersed farmland adjacent to valley floors support habitat for cottontail rabbits, white-tailed deer, ruffed grouse, and gray squirrels. The mountainous region that has extensive forests and is in the western part of the county supports habitat for snowshoe hare, deer, and black bear. Songbirds are typical throughout the county, but more diversity is in areas of mixed landuse.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 13, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs. Some species that are used as examples are not indigenous to Ulster County.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of native plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, and cordgrass and rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs. Some species that are used as examples are not indigenous to Ulster County.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail rabbit, and red fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Soil properties

Edward A. Fernau, senior soil engineer, New York State Department of Transportation, Soil Mechanics Bureau, helped to prepare this section.

Extensive data about soil properties are summarized on the following pages. The two main sources of these

data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 14 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 14 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 14 in the standard terms used by the U.S. Department of Agriculture (*8*). These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 17. The estimated classification, without group index numbers, is given in table 14. Also in table 14 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 15 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 16 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil

profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table K are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than on installation that is entirely within one kind of soil or within one soil horizon.

Engineering test data

The results of analyses of engineering properties of several typical soils of the survey area are given in table 17.

The data presented are for soil samples that were collected from carefully selected sites. The soil profiles sampled are typical of the series discussed in the section "Soil series and morphology." The soil samples were analyzed by the New York State Department of Transportation, Soil Mechanics Bureau.

The methods used in obtaining the data are listed by code in the next paragraph. Most of the codes, in parentheses, refer to the methods assigned by the American Association of State Highway and Transportation Officials (*1*). The codes for shrinkage and Unified classification are those assigned by the American Society for Testing and Materials (*2*).

The methods and codes are AASHTO classification (M-145-66); Unified classification (D-2487-66T); Grain size distribution (T88-57); liquid limit (T89-60); plasticity index (T90-56); moisture-density, method C (T99-57); and shrinkage (D-427).

Engineering properties of geologic deposits

The unconsolidated geologic deposits in Ulster County are glacial till, outwash, ice-contact, lacustrine, alluvial, and organic. The engineering significance of these deposits is greatly influenced by the mode of deposition, which determines the texture of the material and the internal structure of the deposit. Other influences are the position in the landscape and the position and kind of water table. In Ulster County, the unconsolidated geologic deposits are placed in the following categories: Deep till deposits, Shallow-to rock deposits, Stratified coarse grained deposits, Stratified fine grained deposits, and Organic deposits.

Deep till deposits.—Deep till deposits are unstratified, highly variable mixtures of all particle sizes from rock fragments to clay. This material was scoured and transported from nearby sources by glacial ice and then deposited as a general ground cover either as till plains or as a moraine. Isolated lenses or pockets of sorted material can occur, especially in the morainic areas. Bedrock is generally more than 5 feet below the surface, but in areas of folded bedrock this depth can vary or some rock outcrop can occur. The individual rock and mineral fragments in the soil generally reflect the kind of bedrock in the area.

Soils formed in mixed deep till deposits are Bath, Cambridge, Lackawanna, Lyons, Mardin, Menlo, Morris, Scriba, Stockbridge, Swartswood, Valois, Volusia, Wellsboro, and Wurtsboro soils. The Cayuga; Canandaigua, till substratum; and Churchville soils formed in fine grained material over glacial till.

These deposits are the most dense and compact of the unconsolidated deposits in the county because they have been subjected to the compactive weight of overriding ice. Deep till soils are gently sloping to very steep and many landscapes are such that extensive cut and fill earthwork is involved for most construction projects. The soils generally provide stable, relatively incompressible foundations for engineering works. If fill material from these deposits is properly compacted, it provides stable embankments although in some areas boulders must be removed from the fill material. Steep cut slopes are commonly subject to surface sloughing and erosion.

Shallow-to-rock deposits.—Two types of shallow-to-rock deposits are in Ulster County. The most extensive consists of glacial till deposited as a thin veneer over bedrock; the less extensive is shallow accumulations of muck over bedrock. The soil in these deposits is generally 1 to 5 feet thick, and rock outcrops are common in some areas. Landforms and topography generally are controlled by the bedrock.

Soils formed in shallow glacial till over sandstone and siltstone are Arnot and Lordstown soils. Farmington soils are over limestone, and Manlius, Nassau, and Oquaga soils are over shale. Palms muck, bedrock variant, formed in organic matter over various kinds of bedrock.

Deposits of shallow glacial till generally have adequate foundation strength for light structures; however, the main engineering concerns in places can relate to the underlying bedrock and ground water conditions. Landforms in places can require extensive cut and fill earthwork for engineering works. Generally, shale bedrock is softer and more deeply weathered than the limestone, siltstone, and sandstone but occasional harder lenses occur. Fill material is limited in quantity because of the bedrock.

Stratified coarse grained deposits.—Materials dominated by gravel and sand sorted by glacial melt water into layered or stratified deposits are included in this category. They occupy such geologic landforms as outwash plains and terraces, kames, and the coarser parts of deltas and other lacustrine shore deposits. The strata within these deposits can be well sorted or poorly sorted and have particle sizes ranging from cobblestones to silt. The deposits generally are loose and porous.

The Atherton, Castile, Chenango, Haven, Hoosic, Red Hook, and Tunkhannock soils formed in gravelly deposits on outwash plains, terraces, or kames. Sandy deposits of deltaic origin are Lamson, Plainfield, Pompton, Riverhead, and Walpole soils. The Barber, Basher, Suncook, and Tioga soils formed in alluvial deposits of sand with silt.

Coarse grained deposits generally have high bearing capacity. Because they are loose and porous, most of these deposits are not highly erodible but are subject to settlement when they are vibrated. However, Plainfield soils are subject to soil blowing when topsoil is removed. Lamson, Pompton, Red Hook, and Walpole soils, which have high content of fine sand and silt and a seasonal high water table, are highly susceptible to frost action. The poorly drained and very poorly drained Lamson soils are subject to ponding after heavy rain, and the Barber, Basher, Suncook, and Tioga soils are subject to flooding.

These deposits of gravel and sand have many uses as construction material. Depending on gradation, soundness, and plasticity they can be used as: fill material for highway embankments; fill material for parking areas and developments; fill material to decrease stress on underlying soils so construction operations can progress; subbase for pavements; wearing surfaces for driveways, parking lots, and some roads; material for highway shoulders; free draining backfill for structures and pipes; outside shells of dams for impounding water; slope protection blankets to drain and help stabilize wet cut slopes; and sources of sand and gravel for general use.

Stratified fine grained deposits.—These deposits consist of lacustrine, fine grained sediment transported by glacial melt water and deposited in quiet glacial lakes and ponds. Some soils on flood plains are in more recent slack water areas. Distinct layers of laminations, generally of silt- and clay-sized particles, occur. Although these deposits are mostly silt, there is generally enough clay to make them plastic and sticky.

Soils formed in deep lake-laid silt and clay deposits are Hudson, Madalin, Odessa, and Rhinebeck soils. Canandaigua, Raynham, and Williamson soils are in the deep silty areas of deltas. Scio; Tunkhannock, clay substratum; and Unadilla soils are water-laid deposits on terraces. Hamlin, Middlebury, Teel, and Wayland soils are alluvial soils on flood plains.

Because of their fine texture and high moisture content, these deposits have relatively low strength. They generally are highly compressible and subject to settlement over a long period. The soils that have a high content of silt and fine sand are less compressible but are highly erodible and are susceptible to frost. Hamlin,

Middlebury, Teel, and Wayland soils are prone to inundation.

The fine grained deposits are difficult to use for engineering works, especially on the flat, wet soils that are subject to ponding, such as Canandaigua and Madalin soils. Sites for embankments and heavy structures or buildings on all soils formed in these finer sediments must be investigated for strength, settlement characteristics, and effects of ground water.

Organic deposits.—Organic deposits are mostly an accumulation of plant material in varying states of decomposition. In places, they include a minimal amount of inwashed mineral soil. They are in very poorly drained depressions.

Carlisle and Palms soils are over mineral soil at varying depths. The soils in organic deposits are entirely unsuitable for foundations because they are very weak and highly compressible. Generally, the organic material should be removed to suitable underlying material and replaced with suitable backfill. Filling over organic deposits without first removing the unsuitable material causes long-term settlement.

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*8*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Arnot series

The Arnot series consists of loamy-skeletal, mixed, mesic Lithic Dystrochrepts. These soils are shallow, somewhat excessively drained to moderately well drained, and nearly level to very steep. They are on glacially modified, bedrock controlled landforms. These soils formed in a thin mantle of glacial till derived mainly from sandstone, siltstone, and shale. They have a medium textured subsoil. Slope ranges from 0 to 70 percent, but is dominantly 3 to 70 percent.

Arnot soils are commonly associated with the well drained Lordstown soils and the well drained to excessively drained Oquaga soils where bedrock is at a depth of 20 to 40 inches. They are also closely associated with the shallow, somewhat poorly drained to poorly drained Tuller soils. Arnot soils have a lower base status and more coarse fragments in the solum than Farmington soils, which are shallow to limestone bedrock. They do not have the coarse fragments dominated by shale and slate that Nassau soils have.

Typical pedon of Arnot channery silt loam, in an area of Oquaga-Arnot-Rock outcrop complex, moderately steep, in the town of Olive, 0.2 mile northeast of the intersection of Ridge and Whittle Roads, in wooded area.

O1—1 to 1/2 inch; litter of leaves and twigs,

O2—1/2 inch to 0; black (10YR 2/1) partially decomposed leaves and twigs; extremely acid; abrupt wavy boundary.

B21—0 to 3 inches; brown (7.5YR 4/4) channery silt loam; moderate fine granular structure; friable; many fine and few coarse roots; many fine pores; 25 percent coarse fragments; very strongly acid; clear smooth boundary.

B22—3 to 13 inches; reddish brown (5YR 4/4) very channery silt loam; weak fine subangular blocky structure; friable; many fine and few coarse roots; many fine pores; 40 percent coarse fragments; very strongly acid; gradual wavy boundary.

B23—13 to 17 inches; reddish brown (2.5YR 4/4) very channery silt loam; weak fine subangular blocky structure; friable; many fine roots; many fine pores; 50 percent coarse fragments; very strongly acid; abrupt wavy boundary.

IIR—17 inches; dusky red (2.5YR 3/2) fractured shale bedrock.

The thickness of the solum ranges from 10 to 20 inches, which coincides with the depth to bedrock. Rock fragments, dominantly flat stones, range from 20 to 35 percent, by volume, in the A horizon and from 25 to 50 percent in the B horizon. Reaction in the solum in unlimed areas is medium acid to extremely acid.

In many undisturbed pedons, an O2 horizon, 1/2 to 2 inches thick, is directly above the B horizon; and in others, thin A1 and A2 horizons are between the O2 and B horizons. The A1 horizon, where present, has hue of 5YR to 2.5Y, value of 3 or 4, and chroma of 2 or 3. The fine earth is silt loam or loam. The A2 horizon has hue of 5YR to 10YR, value of 6 or 7, and chroma of 2.

The B horizon has hue of 2.5YR to 2.5Y, value of 3 to 6, and chroma of 3 to 6. The fine earth is silt loam or loam. Structure is very weak to moderate, fine or medium subangular blocky or granular.

Some of the deeper pedons have a very thin C horizon. Few to common mottles of high chroma are above the bedrock in places.

Bedrock ranges from massive sandstone to interbedded sandstone, siltstone, and shale. It is reddish, olive, or gray.

Atherton series

The Atherton series consists of fine loamy, mixed, nonacid, mesic Aeric Haplaquepts. These soils are deep, poorly drained and very poorly drained, and nearly level. They are on glacial outwash terraces, stream terraces, and kame-kettle landforms. These soils formed in glacial outwash material derived mainly from sandstone and shale. They have a medium textured and moderately fine textured subsoil. Slope ranges from 0 to 2 percent, but is dominantly 0 to 1 percent.

Atherton soils are commonly in depressions adjacent to the somewhat poorly drained Red Hook soils, the moderately well drained Castile soils, the well drained to somewhat excessively drained Chenango and Tunkhannock soils, and the somewhat excessively drained Hoosic soils. Atherton soils contain more gravel and less sand than Lamson soils.

Typical pedon of Atherton silt loam, in the Town of Rochester, about 3,050 feet north on Whitfield Road from its intersection with U.S. Route 209 and 2,440 feet west, in wooded area:

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 6/1) dry; few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate fine subangular blocky structure; friable; many fine roots; 5 percent coarse fragments; neutral; abrupt smooth boundary.

B21g—7 to 13 inches; gray (10YR 5/1) silt loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; friable; common fine roots; common fine pores; 5 percent coarse fragments; medium acid; clear smooth boundary.

B22g—13 to 19 inches; gray (10YR 5/1) silty clay loam; many fine distinct strong brown (7.5YR 5/6) and common fine distinct brown (10YR 4/3) mottles; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; common fine roots; many fine pores; 10 percent coarse fragments; acid; clear wavy boundary.

IIB23—19 to 28 inches; brown (10YR 4/3) gravelly loam; many medium distinct brown (7.5YR 4/2) mottles; weak coarse subangular blocky structure; firm; many fine pores, most have clay linings; 20 percent coarse fragments; neutral; clear wavy boundary.

IIIB3—28 to 34 inches; brown (10YR 4/3) gravelly sandy loam; many fine faint yellowish brown (10YR 5/6) mottles; massive; friable; 30 percent coarse fragments; neutral; gradual irregular boundary.

IIIC—34 to 65 inches; gray (5Y 5/1) stratified layers of massive, friable, very gravelly sandy loam and single grain, loose sand and gravel; 45 percent coarse fragments; neutral.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock is more than 5 feet. Rock fragments, mainly gravel, are 0 to 20 percent, by volume, in the horizons above a depth of 20 inches and average 5 to 35 percent between the depths of 20 to 40 inches. Reaction is strongly acid to neutral above a depth of about 20 inches and medium acid to mildly alkaline between 20 and 40 inches. The C horizon is slightly acid to mildly alkaline.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 0 to 2. In uncleared areas, the A1 horizon is 4 to 8 inches thick.

The B2 horizon to a depth of about 20 inches has hue of 5YR to 5Y, value of 5, and chroma of 1 or 2 and has few to many distinct or prominent mottles. Below this, hue is 5YR to 5Y, value is 4 or 5, chroma is 3 or 4, and mottles are common or many, distinct or prominent, and lower in chroma. Fine earth in the B2 horizon is loam to silty clay loam. Thin contrasting layers of gravel, sand, or silty clay are present in some pedons. Structure is prismatic or subangular blocky or is massive. Consistence is friable or firm.

The B3 horizon is absent in some pedons.

The C horizon consists of stratified sand and gravel intermingled with thin layers of sand to silty clay, with or without gravel.

Barbour series

The Barbour series consists of coarse-loamy over sandy or sandy skeletal, mixed, mesic Fluventic Dystrochrepts. These soils are deep, well drained, and nearly level. They are on flood plains in the Catskill Mountains. These soils formed in alluvium derived from reddish sandstone, siltstone, and shale. They have a medium textured and moderately coarse textured subsoil. Slope ranges from 0 to 3 percent, but is dominantly 0 to 2 percent.

Barbour soils are in a drainage sequence with the moderately well drained to somewhat poorly drained Basher soils, and they formed in similar material to that in which those soils formed. They are also associated with the excessively drained Suncook soils on flood plains. Barbour soils are in positions on flood plains similar to those of the well drained Tioga and Hamlin soils. Barbour soils are redder than Tioga and Hamlin soils. In addition, Barbour soils have a lower base status than Tioga and Hamlin soils and have sand and gravel within 20 to 40 inches of the surface that are not present in these soils.

Typical pedon of Barbour loam, in the town of Shandaken, 1.3 miles south on N.Y. Route 28 from the intersection of N.Y. Routes 28 and 214 and 160 feet west, in meadow:

Ap—0 to 6 inches; dark reddish brown (5YR 3/3) loam; moderate fine granular structure; very friable; many

fine roots; 10 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—6 to 15 inches; reddish brown (5YR 4/3) gravelly loam; weak medium subangular blocky structure parting to weak medium granular very friable; many fine roots; few fine pores; 15 percent coarse fragments; strongly acid; clear wavy boundary.

B22—15 to 25 inches; reddish brown (5YR 4/4) gravelly fine sandy loam; weak medium subangular blocky structure parting to single grain; very friable; many fine roots; many fine and few medium pores; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B3—25 to 28 inches; reddish brown (5YR 4/4) gravelly sandy loam; very weak medium and fine granular structure parting to single grain; very friable; many fine roots; 30 percent coarse fragments; strongly acid; gradual wavy boundary.

IIC—28 to 50 inches; dark brown (7.5YR 4/2) very gravelly sand; single grain; loose; few roots in upper 5 inches, none below; 50 percent coarse fragments; medium acid.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock is more than 5 feet. Rock fragments, mainly gravel, generally increase with depth and range from 0 to 30 percent, by volume, in the A and B horizons, to 15 to 60 percent in the C horizon. The C horizon is 0 to 10 percent cobblestone. Reaction is very strongly acid to medium acid in the solum and very strongly acid to slightly acid in the substratum.

The Ap horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. Structure is weak or moderate granular.

The B2 horizon has hue of 2.5YR to 7.5YR, value of 4, and chroma of 3 or 4. The fine earth is silt loam to fine sandy loam. Structure is weak subangular blocky or granular. Consistence is very friable or friable.

The B3 horizon has colors similar to those of the B2 horizon. The fine earth is sandy loam or fine sandy loam. Structure is weak granular or subangular blocky.

The C horizon is stratified sand and gravel to gravelly loamy fine sand.

Basher series

The Basher series consists of coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts. These soils are deep, moderately well drained to somewhat poorly drained, and nearly level. They are on flood plains. These soils formed in alluvium derived mainly from reddish sandstone, siltstone, and shale. They have a medium textured and moderately coarse textured subsoil. Slope ranges from 0 to 2 percent, but is dominantly 0 to 1 percent.

Basher soils are in a drainage sequence with the well drained Barbour soils, and they formed in similar material to that in which those soils formed. They are in positions on flood plains similar to those of the moderately well drained to somewhat poorly drained Middlebury and Teel soils that have a higher base status and are not so red as Basher soils. In addition, Basher soils contain less silt and very fine sand between a depth of 10 and 40 inches than Teel soils.

Typical pedon of Basher silt loam in the town of Saugerties, 0.85 mile south on Cotton Road from its intersection with N.Y. Route 32 and about 270 feet south, in meadow:

Ap—0 to 9 inches; dark reddish brown (5YR 3/4) silt loam; weak fine granular structure; friable; many fine roots; few fine pores; very strongly acid; clear smooth boundary.

B21—9 to 14 inches; dark reddish brown (5YR 3/4) silt loam; weak medium subangular blocky structure parting to weak medium granular; friable; many fine roots; common fine pores; very strongly acid; clear wavy boundary.

B22—14 to 20 inches; dark reddish brown (5YR 3/4) silt loam; many medium distinct brown (7.5YR 5/4) and few fine distinct brown (7.5YR 5/2) mottles; weak medium subangular blocky structure; friable; common fine roots; common fine pores; very strongly acid; clear wavy boundary.

B3—20 to 27 inches; brown (7.5YR 4/4) silt loam; many medium distinct grayish brown (10YR 5/2) and common fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; common fine pores; very strongly acid; clear wavy boundary.

C1—27 to 42 inches; grayish brown (10YR 5/2) and gray (10YR 5/1) loam; many medium distinct yellowish brown (10YR 5/4) mottles; massive; friable; few fine roots; few fine pores; medium acid; clear irregular boundary.

C2—42 to 52 inches; very dark gray (10YR 3/1) fine sandy loam; massive; very friable; medium acid.

The solum ranges from 17 to 30 inches in thickness. Depth to bedrock is more than 5 feet. Strongly contrasting gravelly or sandy material is deeper than 40 inches. Coarse fragments range from 0 to 20 percent, by volume, in individual horizons above a depth of 40 inches. Reaction is very strongly acid to medium acid in the A and B horizons and strongly acid to slightly acid in the C horizon.

The Ap horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. Structure is weak or moderate granular.

The B horizon has hue of 2.5YR to 7.5YR, value of 3 or 4, and chroma of 4. The fine earth fraction is fine sandy loam, silt loam, or loam. Structure is weak subangular blocky or granular.

The C horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 or 2. The fine earth fraction above a depth of 40 inches is silt loam to fine sandy loam and loam, but layers of loamy fine sand are below a depth of 40 inches in some pedons. Consistence is friable, very friable, or loose.

Bath series

The Bath series consists of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep, well drained, and sloping to very steep. They are on dissected glacial till plains. These soils formed in glacial till derived mainly from sandstone, siltstone, and shale. A dense fragipan that restricts rooting is at a depth of 26 to 38 inches. These soils have a medium textured and moderately coarse textured subsoil. Slope ranges from 8 to 65 percent, but is dominantly 8 to 25 percent.

Bath soils are in a drainage sequence with the moderately well drained Mardin soils, the somewhat poorly drained Volusia soils, and the poorly drained and very poorly drained Lyons. They formed in materials similar to that in which those soils formed. Bath soils are deeper to the fragipan than Mardin soils. They are similar to the Swartswood, Lackawanna, and Stockbridge soils, but they have a higher content of silt and very fine sand above the fragipan than Swartswood soils, are not red as Lackawanna soils, and have a fragipan which Stockbridge soils do not have.

Typical pedon of Bath gravelly silt loam, 8 to 15 percent slopes, in the town of New Paltz, 0.75 mile west-south-west of Clintondale, about 3,625 feet north of the Lloyd-Plattekill town line on U.S. route 44 and N.Y. Route 55 and 820 feet west, in apple orchard:

Ap—0 to 6 inches; dark brown (10YR 4/3) gravelly silt loam; moderate; fine granular structure; very friable; many fine roots; 25 percent coarse fragments; slightly acid; abrupt wavy boundary.

B21—6 to 11 inches; yellowish brown (10YR 5/4) gravelly loam; weak medium and thick platy structure; friable; common fine roots; few fine pores; 25 percent coarse fragments; very strongly acid; clear wavy boundary.

B22—11 to 24 inches; yellowish brown (10YR 5/6) gravelly loam; weak medium subangular blocky structure; friable; few fine roots; few fine pores; 30 percent coarse fragments; very strongly acid; clear wavy boundary.

B23—24 to 28 inches; yellowish brown (10YR 5/4) gravelly loam; weak fine and medium subangular blocky structure; friable; few fine roots; common fine pores; 30 percent coarse fragments; very strongly acid; clear wavy boundary.

Bx—28 to 55 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak very coarse prismatic structure parting to weak thin platy; firm, brittle; few fine roots along faces of prisms; thin clay films in many fine pores; yellowish brown (10YR 5/4) streaks between the prisms and as pockets in the prisms; many oxide stains; 35 percent coarse fragments; very strongly acid; gradual wavy boundary.

Cx—55 to 65 inches; dark yellowish brown (10YR 4/4) gravelly loam; massive; firm, brittle; many fine pores; thin patchy clay films in pores; many oxide stains; 35 percent coarse fragments; strongly acid.

The solum ranges from 40 to 80 inches in thickness. Depth to the top of the fragipan ranges from 26 to 38 inches. Bedrock is at a depth of more than 60 inches, but it is not more than 40 inches where these soils are in a complex with the Nassau soils. Rock fragments are mainly gravel, cobblestones, flagstones, and stone. Some are angular. The rock fragments are dominantly sandstone, a minor amount is siltstone and shale. They range from 15 to 35 percent, by volume, in individual horizons above the fragipan and from 15 to 65 percent in the fragipan and C horizon. Reaction, in unlimed areas is strongly acid or medium acid in the A and B horizons and strongly acid to moderately alkaline in the C horizon.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. The fine earth is silt loam or loam.

The B2 horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. Mottles are absent above the fragipan, except in pedons that have an A2 horizon. The fine earth is silt loam or loam. Structure is weak platy to weak or moderate subangular blocky.

The Bx horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6 with or without mottles. The fine earth is silt loam to sandy loam. The interiors of very coarse prisms are massive or part to weak platy or subangular blocky structure. Consistence is firm or very firm, and brittle. Thin clay films are in the pores, but there is not evidence of appreciable clay movement.

The C horizon is similar to the Bx in color and texture but does not have prismatic structure.

Cambridge series

The Cambridge series consists of fine-loamy, mixed, mesic Aqueptic Fragiudalfs. These soils are deep, moderately well drained, and gently sloping and sloping. They are on glacial till plains. These soils formed in glacial till strongly influenced by siltstone, sandstone, and shale with a small amount of limestone. A dense fragipan that restricts rooting is at a depth of 16 to 26 inches. These soils have a medium textured and moderately fine textured subsoil. Slope ranges from 3 to 15 percent, but is dominantly 3 to 12 percent.

Cambridge soils are near the moderately well drained Cayuga soils, the somewhat poorly drained Churchville soils, and the poorly drained and very poorly drained Madalin soils. They do not have the moderately fine textured and fine textured lacustrine cap that Cayuga

and Churchville soils have. Cambridge soils are geographically associated with Bath and Mardin soils, which have a lower content of clay above the fragipan than Cambridge soils.

Typical pedon of Cambridge gravelly silt loam, 8 to 15 percent slopes, in the town of New Paltz, 4 miles southwest of New Paltz, 0.56 mile southwest on Albany Post Road from its intersection with Decker Road and 738 feet west, in brushy area:

Ap—0 to 6 inches; brown (10YR 4/3) gravelly silt loam; moderate medium and coarse granular structure; friable; many fine roots; 20 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—6 to 20 inches; yellowish brown (10YR 5/4) gravelly loam; weak medium subangular blocky structure; friable; common fine roots; common fine pores; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B22—20 to 23 inches; dark yellowish bown (10YR 4/4) gravelly clay loam; many medium and fine distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; firm; few fine roots; common fine pores; 25 percent coarse fragments; strongly acid; clear wavy boundary.

Bxt—23 to 64 inches; brown (10YR 4/3) gravelly clay loam; weak very coarse prismatic structure parting to weak medium platy; firm, slightly brittle; few fine roots along faces of prisms; clay linings in common fine pores; prisms are separated by light brownish gray (2.5Y 6/2) streaks with yellowish brown (10YR 5/6) borders; thin patchy light brownish gray (2.5Y 6/2) clay films on faces of prisms; many oxide stains; 25 percent coarse fragments; slightly acid in the upper part and neutral in the lower part; abrupt wavy boundary.

IIR—64 inches; dark gray (10YR 4/1) shale bedrock. Depth to bedrock is more than 5 feet. The solum ranges from 50 to 80 inches in thickness. Depth to the fragipan ranges from 16 to 26 inches. Rock fragments range from 5 to 25 percent, by volume, in the A and B2 horizons and from 10 to 35 percent in the Bx horizon. Reaction, in unlimed areas, is very strongly acid or strongly acid in the A and B2 horizons and slightly acid in the upper part of the Bx horizon and slightly acid or neutral in the lower part. The C horizon is neutral or mildly alkaline.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. Structure is weak or moderate granular.

The B2 horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. The fine earth is loam to light silty clay loam. Structure is weak or moderate, fine or medium subangular blocky. Consistence is friable or firm, and brittle or slightly brittle.

The Bx horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. The fine earth is heavy loam to silty clay loam. Structure is very coarse prismatic parting to very weak or weak angular blocky or platy. Consistence is firm or very firm, and brittle.

A C horizon is below the Bx horizon in most pedons. It has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. Texture is gravelly loam or gravelly silt loam. Structure is weak platy or is massive.

Canandaigua series

The Canandaigua series consists of fine-silty, mixed, nonacid, mesic Mollic Haplaquepts. These soils are deep, poorly drained and very poorly drained, and nearly level to depressional. They are on glacial-stream terraces and lake plains and in upland basins formerly occupied by glacial lakes. These soils formed in lacustrine deposits of silt, very fine sand, and clay. They dominantly have a medium textured and moderately fine textured subsoil. Slope is mainly less than 1 percent.

Canandaigua soils are in a drainage sequence with the well drained Unadilla soils, the moderately well drained Scio soils, and the somewhat poorly drained Raynham soils. They are also associated with the moderately well drained Williamson soils that have a fragipan. Canandaigua soils are similar in texture to the Wayland soils that are on flood plains and have an irregular distribution of organic matter as depth increases.

Typical pedon of Canandaigua silt loam, in the town of Shawangunk, 0.35 mile northeast on New Prospect Road from its intersection with Wallkill Avenue and 740 feet east, in pasture:

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam; gray (10YR 5/1) dry; moderate fine granular structure; friable; many fine roots; slightly acid; abrupt wavy boundary.

B21g—9 to 18 inches; gray (5Y 6/1) silty clay loam; many fine prominent brownish yellow (10YR 6/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; common fine roots; few fine pores; light olive gray (5Y 6/2) silt coatings on faces of peds; neutral; clear wavy boundary.

B22g—18 to 28 inches; gray (5Y 5/1) silt loam; many fine and medium prominent yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure parting to moderate coarse subangular blocky; friable; few fine roots, mostly along faces of peds; few fine pores; gray (5Y 5/1) silt coatings on faces of peds; common oxide stains; neutral gradual wavy boundary.

B23g—28 to 37 inches; gray (10YR 5/1) silt loam; many medium distinct yellowish brown (10YR 5/4) mottles;

moderate coarse prismatic structure parting to weak coarse subangular blocky; friable; few fine roots; few fine pores; gray (5Y 5/1) silt coatings on faces of peds; calcareous; mildly alkaline; gradual wavy boundary.

C—37 to 60 inches; yellowish brown (10YR 5/4) silt loam; many fine and medium distinct grayish brown (2.5Y 5/2) mottles; massive; friable; very few fine pores; calcareous; moderately alkaline.

The solum ranges from 25 to 40 inches in thickness. Depth to bedrock is more than 5 feet. Depth to carbonates ranges from 25 to 60 inches. Reaction increases as depth increases. It is medium acid to mildly alkaline in the A horizon, slightly acid to mildly alkaline in the B horizon, and neutral to moderately alkaline in the C horizon.

The Ap horizon has hue of 7.5YR to 2.5Y, value of 2 or 3, and chroma of 1 or 2.

The B horizon has hue of 5Y to 5YR, value of 4 to 6, and chroma of 1 or 2, but mottles are of higher chroma. This horizon is typically silt loam, but subhorizons are very fine sandy loam to silty clay loam. Structure is weak or moderate prismatic or subangular blocky.

The C horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 2 to 4. It is generally layered silt loam and very fine sandy loam and has occasional varves of silty clay loam. Some pedons have nonstratified gravelly loam or gravelly silt loam below a depth of 40 inches.

Carlisle series

The Carlisle series consists of euic, mesic Typic Medisaprists. These soils are deep, very poorly drained, nearly level to depressional, and organic. They are in swamps and marshes within the glaciated uplands and outwash plains. These soils formed almost entirely in accumulated organic matter. The prolonged high water table has inhibited the oxidation of remnants of such plants as mosses, sedges, and some woody plants adapted to wet sites. Slope is generally less than 2 percent.

Carlisle soils are on landscapes similar to those of the Palms soils. They are associated with Canandaigua, Lyons, Menlo, and Atherton soils that formed in mineral material at the margin of bogs. Carlisle soils do not have the mineral substratum at a depth of 16 to 50 inches that Palms soils have. They are deeper to bedrock than Palms, bedrock variant soils.

Typical pedon of Carlisle muck, in the town of Esopus, about 1,565 feet south-southeast on Floyd Ackert Road from its intersection with Swartekill Road and 250 feet northeast, in wooded area:

Oa1—0 to 12 inches; black (10YR 2/1) broken face, pressed, and rubbed muck; moderate medium granular structure; very friable; many fine roots; no fiber; 30 percent silt content; medium acid; gradual wavy boundary.

Oa2—12 to 32 inches; very dark grayish brown (10YR 3/2) broken face, pressed, and rubbed muck; massive; nonsticky, slightly plastic; 40 percent fiber undisturbed; 10 percent fiber rubbed; less than 5 percent mineral content; medium acid; clear boundary.

Oa3—32 to 61 inches; very dark grayish brown (10YR 3/2) broken face, black (10YR 2/1) pressed and rubbed muck; massive; nonsticky, slightly plastic; 35 percent fiber undisturbed; 5 percent fiber rubbed; medium acid; clear boundary.

The organic deposit is more than 51 inches thick. Depth to bedrock is more than 5 feet. Reaction increases as depth increases in most pedons and is medium acid to neutral above a depth of 51 inches. Fibers are mainly herbaceous, but 10 to 25 percent is woody. Woody fragments from 1/4 inch to more than a foot in diameter are throughout most pedons and consist of twigs, branches, logs, or stumps.

The Oa1 horizon has hue of 10YR to 5YR, value of 2, and chroma of 0 or 1. Structure is weak or moderate, fine to coarse granular.

The Oa2 horizon has hue of 10YR to 5YR, value of 2 or 3, and chroma of 0 to 2. Chroma and value can vary 1 or 2 units when the soil is rubbed. This horizon is massive or has weak granular or subangular blocky structure. Consistence is very friable or nonsticky and slightly plastic.

The Oa3 horizon is similar to the Oa2 horizon in color and consistence. The material below a depth of 51 inches is generally muck for 1 or 2 feet, but ranges from glacial till to marl and sand and gravel.

Castile series

The Castile series consists of loamy-skeletal, mixed, mesic Aquic Dystrochrepts. These soils are deep, moderately well drained, and nearly level and gently sloping. They are on glacial outwash plains, valley trains, and water-deposited moraines. These soils formed in water-sorted gravelly and sandy material derived from sandstone, shale, and siltstone. They have a medium textured and moderately coarse textured subsoil. Slope ranges from 0 to 8 percent, but is dominantly 2 to 5 percent.

Castile soils are commonly associated with the drier Chenango, Hoosic, and Tunkhannock soils; the somewhat poorly drained Red Hook soils; and the poorly drained to very poorly drained Atherton soils. Castile soils are similar to Pompton soils in drainage, but they contain more coarse fragments between a depth of 10 and 40 inches than Pompton soils.

Typical pedon of Castile gravelly silt loam, 0 to 3 percent slopes, in the town of Plattekill, 0.25 mile north

on Orchard Drive from its intersection with Anderson Road and 565 feet east, in cropland:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) gravelly silt loam; moderate fine granular structure; friable; many fine roots; 20 percent coarse fragments; medium acid; abrupt smooth boundary.

B21—8 to 14 inches; yellowish brown (10YR 5/4) gravelly loam; weak fine subangular blocky structure; friable; common fine roots; common fine pores; dark grayish brown (10YR 4/2) fillings in old root and worm channels; 25 percent coarse fragments; strongly acid; clear smooth boundary.

B22—14 to 19 inches; dark yellowish brown (10YR 4/4) gravelly loam; many fine faint yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; friable; few fine roots; many fine pores; dark grayish brown (10YR 4/2) fillings in old root and worm channels; 20 percent coarse fragments; strongly acid; abrupt wavy boundary.

B23—19 to 24 inches; yellowish brown (10YR 5/4) very gravelly loam; many medium distinct light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine pores; many oxide stains; 40 percent coarse fragments; strongly acid; clear wavy boundary.

B3—24 to 28 inches; dark grayish brown (10YR 4/2) very gravelly sandy loam; common fine distinct brown (10YR 5/3) mottles; massive; very friable; many oxide stains; 50 percent coarse fragments; strongly acid; gradual wavy boundary.

IIC—28 to 50 inches; very dark grayish brown (10YR 3/2) stratified very gravelly sand; single grain; loose; 55 percent coarse fragments; strongly acid increasing to medium acid as depth increases.

The solum ranges from 24 to 36 inches in thickness. Depth to bedrock is more than 5 feet. Rock fragments range from 20 to 55 percent, by volume, in the B horizon and from 40 to 70 percent in the C horizon. They are mainly gravel but include cobblestones, angular fragments, and flagstone. Reaction, in unlimed areas, is strongly acid or very strongly acid to a depth of 30 inches. Below 30 inches, it is less acid as depth increases.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3.

The B2 horizon has hue of 10YR, value of 4 or 5, and chroma of 4. The fine earth is sandy loam to silt loam, but it is commonly loam. Structure is weak granular or subangular blocky. Consistence is very friable to slightly firm.

The B3 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It has faint or distinct mottles. Consistence is friable to loose.

The C horizon is stratified very gravelly sand or very gravelly loamy sand.

Cayuga series

The Cayuga series consists of fine, illitic, mesic Glossoboric Hapludalfs. These soils are deep, well drained and moderately well drained, and gently sloping and sloping. They are adjacent to or in old glacial lakebeds. These soils formed in relatively thin lacustrine deposits of clay and silt over glacial till. They have a fine textured and moderately fine textured subsoil. Slope ranges from 3 to 15 percent, but is dominantly 3 to 12 percent.

Cayuga soils are in a drainage sequence with the somewhat poorly drained Churchville soils and the poorly drained and very poorly drained Madalin soils. They are very similar to Hudson and Schoharie soils that formed in deep lacustrine deposits. Cayuga soils do not have the fragipan that the more silty Williamson soils have. Williamson soils formed in wind- or water-deposited silt, very fine sand, and some clay.

Typical pedon of Cayuga silt loam, 3 to 8 percent slopes, in the town of New Paltz, about 990 feet west on Gatehouse Road from its intersection with N.Y. Route 299 and about 2,060 feet north, in cropland:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; moderate fine and medium granular structure; friable; many fine roots; 10 percent gravel; slightly acid; abrupt smooth boundary.

B&A—8 to 15 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; pale brown (10YR 6/3), very pale brown (10YR 7/3) dry, silt coatings 1 to 2 millimeters thick on faces of peds; brown (10YR 4/3) fillings in old root and worm channels; 10 percent gravel; medium acid; clear wavy boundary.

B21t—15 to 19 inches; yellowish brown (10YR 5/4) silty clay; many fine distinct pale brown (10YR 6/3) mottles; moderate coarse subangular blocky structure; very firm; few fine roots; few fine pores; thin clay films on faces of peds; common very dark gray (10YR 3/1) oxide stains; 10 percent gravel; medium acid; abrupt wavy boundary.

B22t—19 to 29 inches; light olive brown (2.5Y 5/4) silty clay; many medium prominent pale yellow (5Y 7/3) and few fine faint yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; very firm; few fine roots on faces of peds; few fine pores; thin continuous clay films on faces of peds and in pores; many very dark gray (10YR 3/1) oxide stains; 10 percent gravel; medium acid; clear wavy boundary.

IIB23t—29 to 34 inches; olive brown (2.5Y 4/4) gravelly silty clay loam; few fine faint light olive brown (2.5Y 5/6) mottles; moderate coarse subangular blocky structure; very firm; few fine pores; thin continuous light olive gray (5Y 6/2) clay films on faces of peds and in pores; common very dark gray (10YR 3/1)

oxide stains; 20 percent gravel; neutral; clear, wavy boundary.

IIB3—34 to 39 inches; olive brown (2.5Y 4/4) gravelly clay loam; common fine faint light olive brown (2.5Y 5/6) mottles; very weak very coarse subangular blocky structure; very firm; few fine pores; thin continuous light olive gray (5Y 6/2) clay films on faces of peds and in pores; 25 percent gravel; calcareous; mildly alkaline.

IIC—39 to 50 inches; olive brown (2.5Y 4/4) gravelly clay loam; massive; very firm; 25 percent gravel; calcareous; moderately alkaline.

Thickness of the solum ranges from 20 to 40 inches, which coincides with the depth to contrasting material. Depth to bedrock is more than 5 feet. Rock fragments, mainly gravel, generally increase as depth increases and are 0 to 10 percent, by volume, in the upper part of the solum. The C horizon has 10 to 35 percent rock fragments.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. Reaction is medium acid to neutral.

An A2 horizon, 1 to 8 inches thick, is present in undisturbed areas.

The B&A horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4.

The B2 horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4. The fine earth is silty clay to clay loam. Structure is moderate or strong, medium or coarse angular or subangular blocky. Consistence is firm or very firm. Reaction is medium acid to neutral.

The B3 horizon, where present, contains less clay than the B2 horizon. The fine earth is silty clay loam or clay loam. Reaction is neutral or mildly alkaline.

In the C horizon fine earth is fine sandy loam to silty clay loam. Reaction is neutral to moderately alkaline.

Chenango series

The Chenango series consists of loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are deep, well drained to somewhat excessively drained, and nearly level to sloping. They are on glacial outwash plains and associated kames, and water-deposited moraines. These soils formed in glacial outwash deposits derived mainly from gray and brown sandstone, shale, and siltstone. They have a medium textured and moderately coarse textured subsoil. Slope ranges from 0 to 15 percent, but is dominantly 2 to 8 percent.

Chenango soils are in a drainage sequence with the moderately well drained Castile soils, the somewhat poorly drained Red Hook soils, and the poorly drained to very poorly drained Atherton soils that formed in similar material. Chenango soils are similar to Hoosic, Tunkhannock, and Haven soils, except they contain more silt and less sand in the solum than Hoosic soils and are yellower than Tunkhannock soils. They have more coarse fragments between a depth of 10 and 40 inches than Haven soils and do not have the contrasting textures that these soils have.

Typical pedon of Chenango gravelly silt loam, 3 to 8 percent slopes, in the town of Lloyd, about 500 feet southeast on old N.Y. Route 299 from its intersection with Pancake Hollow Road and 105 feet east, in idle area near a gravel pit:

Ap—0 to 9 inches; brown (10YR 4/3) gravelly silt loam; moderate fine granular structure; friable; many fine roots; 20 percent coarse fragmets; strongly acid; abrupt smooth boundary.

B21—9 to 15 inches; yellowish brown (10YR 5/6) gravelly silt loam; weak fine subangular blocky structure; friable; common fine roots; common fine pores; common old root and worm channels filled with brown (10YR 4/3) silt loam; 25 percent coarse fragments; strongly acid; clear wavy boundary.

B22—15 to 28 inches; yellowish brown (10YR 5/6) gravelly loam; weak fine and medium subangular blocky structure; friable; few fine roots; many fine pores; 25 percent coarse fragments; strongly acid; clear irregular boundary.

B3—28 to 35 inches; brown (10YR 4/3) very gravelly fine sandy loam; very weak fine subangular blocky structure; friable; few fine roots; many fine pores; 45 percent coarse fragments; strongly acid; clear irregular boundary.

IIC—35 to 80 inches; dark brown (10YR 3/3) very gravelly sand; single grain; loose; few fine roots in upper 6 inches; 65 percent coarse fragments; medium acid.

The solum ranges from 24 to 36 inches in thickness. Depth to bedrock is more than 5 feet. Rock fragments are mainly gravel with some cobblestones and angular fragments. They range from 20 to 55 percent, by volume, in the B horizon and from 50 to 70 percent in the C horizon, but they average more than 35 percent to a depth of 10 to 40 inches. Reaction, in unlimed areas, is very strongly acid or strongly acid above a depth of 30 inches. Below 30 inches, it is strongly acid to slightly acid.

The Ap horizon has hue of 2.5Y or 10YR, value of 3 to 5, and chroma of 2 or 3.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The fine earth is silt loam, loam, or very fine sandy loam to a depth of more than 20 inches. Content of sand typically increases as depth increases. Loam or fine sandy loam is common in the fine earth immediately above the C horizon.

Texture of the C horizon is very gravelly loamy coarse sand or very gravelly sand.

Churchville series

The Churchville series consists of fine, illitic, mesic Aeric Ochraqualfs. These soils are deep, somewhat poorly drained, and nearly level and gently sloping. They are adjacent to or within old glacial lakebeds. These soils formed in relatively thin lacustrine deposits of clay and silt over glacial till. They have a fine textured and moderately fine textured subsoil. Slope ranges from 0 to 8 percent.

Churchville soils are in a drainage sequence with the well drained and moderately well drained Cayuga soils and the poorly drained and very poorly drained Madalin soils. They are similar in texture and drainage to Rhinebeck and Odessa soils that formed in deeper lacustrine deposits. In addition, Churchville soils are not so red as Odessa soils. They have a finer textured solum than Raynham soils.

Typical pedon of Churchville silt loam, 3 to 8 percent slopes, in the town of New Paltz, about 660 feet west on Gatehouse Road from its intersection with N.Y. Route 299 and 1,980 feet north, in cropland:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam; light gray (2.5Y 7/2) dry; moderate fine granular structure; friable; many fine roots; 5 percent coarse fragments; neutral; abrupt smooth boundary.

B&A—10 to 14 inches; yellowish brown (10YR 5/4) silty clay loam; common fine faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; grayish brown (10YR 5/2) silt coatings on faces of peds and in old root and worm channels; 2 percent coarse fragments; slightly acid; clear smooth boundary.

B21t—14 to 28 inches; dark brown (10YR 4/3) silty clay; many fine prominent gray (5Y 6/1) mottles; moderate coarse prismatic structure parting to moderate medium and coarse angular blocky; very firm; few fine roots along faces of peds; few fine pores; thin continuous light olive gray (5Y 6/2) clay films on faces of peds; many oxide concretions and stains; 5 percent coarse fragments; slightly acid; gradual wavy boundary.

B22t—28 to 34 inches; olive brown (2.5Y 4/4) light silty clay; common fine distinct gray (5Y 6/1) mottles; moderate coarse subangular blocky structure; very firm; few fine pores; thin continuous light olive gray (5Y 6/2) clay films on faces of peds; many oxide concretions and stains; 10 percent coarse fragments; neutral; clear wavy boundary.

IIB3—34 to 39 inches; olive brown (2.5Y 4/4) clay loam; weak coarse subangular blocky structure; very firm; no pores; thin continuous gray (5Y 6/1) clay films on faces of peds; 10 percent coarse fragments; calcareous; mildly alkaline.

IIC—39 to 54 inches; olive brown (2.5Y 4/4) gravelly clay loam; massive; very firm; common oxide concretions and stains; 20 percent coarse fragments; calcareous; moderately alkaline.

The thickness of the solum ranges from 20 to 40 inches, which coincides with the depth to contrasting material. Depth to bedrock is more than 5 feet. Rock fragments increase as depth increases and range from 0 to 10 percent, by volume, in the solum and from 10 to 35 percent in the C horizon.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. Reaction is medium acid to neutral.

An A2 horizon, 1 to 5 inches thick, is present in undisturbed areas.

The B&A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Texture is clay loam to silty clay loam. Structure is weak or moderate subangular blocky. Reaction is slightly acid or neutral.

The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. Clay films have chroma of 2 or less. Texture is silty clay loam, silty clay, or clay loam. Structure is subangular blocky, or weak or moderate prismatic. Consistence is firm or very firm. Reaction is slightly acid to mildly alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. The fine earth is loam to silty clay loam. Consistence is firm or very firm.

Farmington series

The Farmington series consists of loamy, mixed, mesic Lithic Eutrochrepts. These soils are shallow, well drained and somewhat excessively drained, and gently sloping to steep. They formed in 10 to 20 inches of glacial till or in wind or water deposits mixed with glacial till over highly fractured, folded, and tilted limestone bedrock. Bedrock outcrops are common. These soils have a medium textured and moderately coarse textured subsoil. Slope ranges from 3 to 35 percent, but is dominantly 5 to 35 percent.

Farmington soils are in a complex pattern with the deep, well drained Stockbridge soils that formed in similar material. Farmington soils have a higher base status and less coarse fragments in their solum than Arnot and Nassau soils that are also shallow to bedrock.

Typical pedon of Farmington gravelly silt loam, in an area of Stockbridge-Farmington-Rock outcrop complex, hilly, in the town of Saugerties, about 1.3 miles south on Old Stage Road from its intersection with U.S. Route 9W and 160 feet east in wooded area:

O1—1-1/2 inches to 0; litter of leaves, needles, and twigs.

A1—0 to 5 inches; dark brown (10YR 3/3) gravelly silt loam; moderate very fine granular structure; very friable; many fine and few coarse roots; 20 percent

coarse fragments; medium acid; clear smooth boundary.

B21—5 to 10 inches; yellowish brown (10YR 5/4) silt loam; weak thin platy structure; friable; many fine and few coarse roots; common fine pores; 10 percent coarse fragments; slightly acid; clear wavy boundary.

B22—10 to 15 inches; yellowish brown (10YR 5/6) gravelly silt loam; weak medium and fine subangular blocky structure; friable; common fine and few coarse roots; common fine pores; 25 to 30 percent coarse fragments; neutral; abrupt irregular boundary.

IIR—15 inches; fractured limestone bedrock.

The thickness of the solum ranges from 10 to 20 inches, which coincides with the depth to bedrock. Rock fragments range from 5 to 35 percent, by volume, in the solum. Reaction, in unlimed areas, is strongly acid to slightly acid in the A horizon and upper part of the B horizon. It increases as depth increases to slightly acid or neutral above the bedrock.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The fine earth is fine sandy loam to silt loam.

Hamlin series

The Hamlin series consists of coarse-silty, mixed, mesic Dystric Fluventic Euthrochrepts. These soils are deep, well drained, and nearly level. They are on flood plains. These soils formed in alluvium derived mainly from sandstone, siltstone, shale, and limestone. They have a medium textured subsoil. Slope ranges from 0 to 3 percent.

Hamlin soils are in a drainage sequence with the moderately well drained to somewhat poorly drained Teel soils and the poorly drained and very poorly drained Wayland soils that formed in similar material. Hamlin soils are in positions on flood plains similar to those of the well drained Tioga and Barbour soils. They have a higher proportion of silt and very fine sand than Tioga soils and a higher base status than Barbour soils. Hamlin soils do not have the red colors or the sand and gravel layers within 20 to 40 inches of the surface that Barbour soils have. They are similar in texture and drainage to Unadilla soils on glacial-stream terraces.

Typical pedon of Hamlin silt loam, in the town of New Paltz, about 400 feet southwest of the west end of the Wallkill River bridge at New Paltz, in cropland:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; light brownish gray (10YR 6/2) dry; moderate fine and medium granular structure; friable; many fine roots; neutral; clear smooth boundary.

B21—8 to 18 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium and coarse granular structure; friable; common fine roots; many fine pores; neutral; clear smooth boundary.

B22—18 to 26 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine and medium granular structure; friable; common fine roots; many fine pores; neutral; clear smooth boundary.

B23—26 to 38 inches; dark yellowish brown (10YR 3/4) silt loam; moderate medium subangular blocky structure parting to moderate medium granular; friable; common fine roots; many fine pores; neutral; clear smooth boundary.

C—38 to 58 inches; dark grayish brown (10YR 4/2) silt loam; massive; friable, few fine roots; many fine pores; neutral.

The solum ranges from 28 to 40 inches in thickness. Depth to bedrock is more than 5 feet. Strongly contrasting layers are at a depth of more than 40 inches. Coarse fragments are absent or few above a depth of 40 inches. Reaction is slightly acid or neutral in the A and B horizons and neutral or mildly alkaline in the C horizon.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 1 to 3.

The B horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam or very fine sandy loam. Some pedons have thin subhorizons of fine sandy loam. Structure is weak or moderate subangular blocky, granular, or prismatic.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Texture is silt loam to fine sandy loam with or without stratification.

Haven series

The Haven series consists of coarse-loamy over sandy or sandy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are deep, well drained, and nearly level. They are on glacial-stream terraces above the present flood plains. These soils formed in water-sorted loamy material low in content of gravel over stratified gravel and sand. They have a medium textured subsoil. Slope ranges from 0 to 3 percent, but is dominantly 0 to 2 percent.

Haven soils are commonly near the moderately well drained Scio soils on glacial-stream terraces and the Hamlin soils and their wetter associates on flood plains. Haven soils have less coarse fragments in the solum than Chenango, Hoosic, and Tunkhannock soils and have a contrast of texture between the subsoil and substratum that is not present in these soils. In addition, Haven soils are not so red as Tunkhannock soils, and they have more silt and less sand in their solum than Hoosic soils.

Typical pedon of Haven loam, in the town of New Paltz, 250 feet north on Springtown Road from its intersection with Dug Road and 300 feet west, in cropland:

Ap—0 to 11 inches; dark brown (10YR 3/3) loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many fine roots; 2 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—11 to 22 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine roots; common fine pores; 10 percent coarse fragments; medium acid; clear wavy boundary.

IIB22—22 to 25 inches; dark brown (7.5YR 4/4) gravelly loam; weak medium subangular blocky structure; friable; common fine roots; common fine pores; 15 percent coarse fragments; medium acid; clear wavy boundary.

IIIC—25 to 60 inches; dark grayish brown (10YR 4/2) and dark yellowish brown (10YR 4/4) very gravelly sand; single grain; loose; few fine roots in upper 5 inches; 30 percent coarse fragments; strongly acid.

The solum ranges from 18 to 34 inches in thickness. Depth to bedrock is more than 5 feet. Coarse fragments range from 2 to 15 percent, by volume, in the A and B2 horizons, as much as 35 percent in the B3 horizon, and from 10 to 50 percent in the C horizon. Reaction, in unlimed areas, is very strongly acid in the A horizon and very strongly acid or strongly acid in the B and C horizons.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The B2 horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 6. The fine earth is silt loam, loam, or very fine sandy loam. Structure is weak fine or medium subangular blocky. Consistence is friable or very friable.

Some profiles have a thin B3 horizon that has colors similar to those of the B2 horizon. The fine earth is sandy loam to loam.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is stratified sand and gravel or very gravelly sand.

Hoosic series

The Hoosic series consists of sandy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are deep, somewhat excessively drained, and nearly level to very steep. They are on glacial outwash plains, fans, valley trains and related kames, and water-sorted moraines. These soils formed in glacial outwash derived from sandstone, shale, and slate. They have a medium textured to coarse textured subsoil. Slope ranges from 0 to 55 percent, but is dominantly 3 to 16 percent.

Hoosic soils are in a drainage sequence with the moderately well drained Castile soils, the somewhat poorly drained Red Hook soils, and the poorly drained to very poorly drained Atherton soils. They formed in outwash material similar to that in which Chenango, Tunkhannock, and Haven soils formed but contain more sand and less silt in the solum than these soils. Hoosic soils are yellower than Tunkhannock soils and do not have contrast in texture that Haven soils have. They also have more coarse fragments in the surface layer and subsoil than Haven soils.

Typical pedon of Hoosic gravelly loam, 0 to 3 percent slopes, in the town of Rochester, 1 mile northwest of Mettacahonks and 20 feet west of a gravel pit, in cropland:

Ap—0 to 8 inches; dark brown (10YR 3/3) gravelly loam; moderate fine and medium granular structure; friable; many fine roots; common fine pores; 30 percent coarse fragments; medium acid; abrupt smooth boundary.

B21—8 to 14 inches; yellowish brown (10YR 5/6) gravelly loam; weak fine subangular blocky structure; friable; common fine roots; common fine pores; 30 percent coarse fragments; strongly acid; clear wavy boundary.

IIB22—14 to 20 inches; yellowish brown (10YR 5/6) very gravelly sandy loam; weak fine subangular blocky structure; very friable; common fine roots; common fine pores; 40 percent coarse fragments; strongly acid; gradual wavy boundary.

IIIB3—20 to 30 inches; dark yellowish brown (10YR 4/4) very gravelly loamy sand; very weak fine granular structure; very friable; few fine roots; common fine pores; 50 percent coarse fragments; strongly acid; gradual wavy boundary.

IIIC—30 to 80 inches; dark yellowish brown (10YR 4/4) crudely stratified very gravelly sand; single grain; loose; 45 percent gravel and 20 percent cobblestones; strongly acid.

The solum ranges from 22 to 35 inches in thickness. Depth to bedrock is more than 5 feet. Rock fragments, mainly gravel and cobblestones, range from 15 to 35 percent, by volume, in the A horizon, from 25 to 50 percent in the B horizon, and 35 to 70 percent in the C horizon. The C horizon contains 5 to 15 percent, by volume, cobblestones and stones. Reaction, in unlimed areas, is very strongly acid or strongly acid above a depth of 30 inches. Below 30 inches, it is strongly acid or medium acid.

The Ap horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 or 3. The fine earth is sandy loam to loam.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The fine earth in the B horizon above a depth of 22 inches is loam, sandy loam,

or fine sandy loam. It grades to loamy sand or coarser as depth increases in the B horizon. Structure is weak granular or subangular blocky. Consistence is very friable or friable.

The C horizon is stratified gravel and sand to very gravelly loamy sand.

Hudson series

The Hudson series consists of fine, illitic, mesic Glossaquic Hapludalfs. These soils are deep, moderately well drained and gently sloping to steep. They are in dissected lake plains and other glacial landforms that are mantled with lake sediment. These soils formed in calcareous lacustrine deposits of clay and silt. They have a fine textured and moderately fine textured subsoil. Slope ranges from 3 to 35 percent.

Hudson soils are in a drainage sequence with the somewhat poorly drained Rhinebeck soils and the poorly drained and very poorly drained Madalin soils. They formed in material similar to that in which those soils formed. They are similar in texture to Cayuga and Schoharie soils, but they do not have glacial till below a depth of 20 to 40 inches, which Cayuga soils have. Hudson soils are not so red as Schoharie soils. They have a finer textured subsoil than the more silty Williamson soils that have a fragipan.

Typical pedon of Hudson silt loam, 3 to 8 percent slopes, in the town of Shawangunk, 0.8 mile east on Bates Lane from its intersection with Hoagerburgh Road and about 100 feet south, in permanent pasture:

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam; moderate medium and fine granular structure; friable; many fine and few medium roots; slightly acid; abrupt smooth boundary.

A2—7 to 15 inches; light yellowish brown (2.5Y 6/4) light silty clay loam; weak thick platy structure parting to weak fine subangular blocky; firm; many fine roots; common fine pores; strongly acid; clear wavy boundary.

B&A—15 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam; many medium distinct strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to coarse angular blocky; very firm, plastic; many fine roots; common fine pores; continuous pale brown (10YR 6/3) coatings on faces of peds and in pores; common oxide stains and concretions on faces of peds; strongly acid; clear wavy boundary.

B2t—25 to 38 inches; yellowish brown (10YR 5/4) silty clay; many medium faint dark yellowish brown (10YR 4/4) and common fine distinct gray (10YR 6/1) mottles; weak coarse prismatic structure parting to weak coarse angular blocky; very firm, plastic; few fine roots; common fine pores; continuous thin grayish brown (2.5YR 5/2) clay films on faces of peds and in pores; many oxide stains; slightly acid; gradual wavy boundary.

C—38 to 60 inches; dark yellowish brown (10YR 4/4) varved silty clay and silt loam; many medium and coarse distinct grayish brown (10YR 5/2) and many medium and coarse faint yellowish brown (10YR 5/4) mottles; strong inherited platy structure; very firm; few fine pores; calcareous; mildly alkaline.

The solum ranges from 25 to 40 inches in thickness. Depth to carbonates is generally about 34 inches but ranges from 20 to 48 inches. Depth to bedrock is more than 5 feet. Coarse fragments are generally absent, but in some areas they make up as much as 3 percent, by volume, of the solum.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Texture is silt loam or silty clay loam. Reaction is strongly acid to neutral.

The A2 horizon has hue of 10YR or 2.5Y, value of 6, and chroma of 3 or 4. Texture is silt loam or silty clay loam. Structure is weak or very weak platy or subangular blocky. Reaction is strongly acid to neutral.

The B&A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. Degraded surfaces on peds have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 3. Reaction is strongly acid to neutral.

The B2t horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4. Texture is silty clay or heavy silty clay loam. Structure is weak to strong prismatic or blocky. Consistence is firm or very firm and is slightly plastic or plastic. Reaction is medium acid to neutral.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. Consistence is firm or very firm. Reaction is neutral to moderately alkaline.

Lackawanna series

The Lackawanna series consists of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep, well drained, and gently sloping to very steep. They are on glaciated uplands. These soils formed in glacial till derived mainly from reddish sandstone, siltstone, and shale. A dense fragipan that restricts water and root penetration is at a depth of 17 to 36 inches. These soils have a medium textured and moderately coarse textured subsoil. Slope ranges from 3 to 70 percent, but is dominantly 15 to 50 percent.

Lackawanna soils are in a drainage sequence with the moderately well drained Wellsboro soils and the somewhat poorly drained Morris soils. They are also near the very poorly drained Menlo soils in a few areas. Lackawanna soils are similar to Bath and Swartswood soils but have a redder subsoil than these soils. They also have a higher content of silt above the fragipan than Swartswood soils.

Typical pedon of Lackawanna flaggy silt loam, in an area of Lackawanna and Swartswood very bouldery

soils, moderately steep, in the town of Woodstock, 2.5 miles north of Lake Hill on Mink Hollow Road and 0.4 mile east, in wooded area:

O1—2 inches to 1 inch; litter of leaves and twigs.

O2—1 inch to 0; very dark grayish brown (10YR 3/2) partly decomposed leaves and twigs; extremely acid; abrupt smooth boundary.

A1—0 to 3 inches; dark reddish brown (5YR 3/3) flaggy silt loam; moderate fine and medium granular structure; very friable; many fine and few medium roots; 25 percent coarse fragments; very strongly acid; clear wavy boundary.

B21—3 to 9 inches; reddish brown (2.5YR 4/4) gravelly silt loam; moderate fine granular structure; friable; many fine and few medium roots; many fine pores; 25 percent coarse fragments; very strongly acid; clear wavy boundary.

B22—9 to 17 inches; reddish brown (2.5YR 4/4) gravelly silt loam; weak medium subangular blocky structure; friable; many fine and few medium roots; many fine pores; 30 percent coarse fragments; strongly acid; clear wavy boundary.

Bx—17 to 49 inches; dark reddish brown (2.5YR 3/4) gravelly loam; weak very coarse prismatic structure parting to weak medium and coarse subangular blocky; very firm, brittle; few fine roots along faces of prisms; thin clay films in many fine vesicular pores; 20 percent coarse fragments; prisms are separated by pinkish gray (5YR 7/2) streaks; medium acid; diffuse wavy boundary.

C—49 to 80 inches; dusky red (10R 3/3) gravelly loam; massive; very firm; thin clay films in many very fine vesicular pores; 20 percent coarse fragments; medium acid.

The solum ranges from 40 to 75 inches in thickness. Depth to bedrock is more than 5 feet. Depth to the fragipan ranges from 17 to 36 inches. Rock fragments of angular or subrounded sandstone, siltstone, and shale range from 15 to 35 percent, by volume, in individual horizons above the fragipan and from 20 to 35 percent in the fragipan and C horizon. Reaction, in unlimed areas, is very strongly acid or strongly acid in the A and B2 horizons and very strongly acid to medium acid in the Bx and C horizons.

The A1 horizon has hue of 10YR to 5YR and value and chroma of 2 or 3. The Ap horizon has the same colors, except the value ranges to 4. Texture of the fine earth is silt loam or loam.

A thin A2 horizon is present in some undisturbed pedons. It has hue of 5YR to 7.5YR, value of 5 or 6, and chroma of 2 or 3.

The B2 horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. Texture of the fine earth is loam or silt loam. Structure is weak platy, granular, or subangular blocky.

Some pedons have a thin, A'2 horizon that is not mottled immediately above the fragipan.

The Bx horizon has hue of 10R to 5YR, value of 3 to 5, and chroma of 2 to 4. Prisms are generally separated by streaks with brighter colored borders. The fine earth is silt loam to sandy loam. Prisms have platy, subangular blocky, or massive interiors.

The C horizon is similar to the Bx horizon in color and texture.

Lamson series

The Lamson series consists of coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts. These soils are deep, poorly drained and very poorly drained, and nearly level. They are on lake plains and deltas, and in depressions that have restricted outlets for surface water. They formed in water-sorted sediments of predominantly fine and medium sand. These soils dominantly have a moderately coarse textured subsoil. Slope is mainly less than 1 percent.

Lamson soils are in a drainage sequence with the somewhat poorly drained Walpole soils, the moderately well drained Pompton soils, and the well drained Riverhead soils. They formed in material similar to that in which these soils formed. They are similar to Atherton and Canandaigua soils in drainage but are coarser textured than these soils. Lamson soils also do not have the gravel that Atherton soils have.

Typical pedon of Lamson fine sandy loam, in the town of Saugerties, Village of Saugerties, about 900 feet northwest of the ball diamond at Cantine Field, in cropland:

Ap—0 to 10 inches; very dark gray (10YR 3/1) fine sandy loam, light gray (10YR 6/1) dry; moderate medium and coarse granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

B21g—10 to 17 inches; gray (5Y 5/1) sandy loam; many fine prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; friable; common fine roots; common fine pores; slightly acid; clear wavy boundary.

B22—17 to 22 inches; light olive brown (2.5Y 5/4) sandy loam; many medium and coarse prominent gray (N 5/0) mottles; weak coarse prismatic structure; friable; common fine roots; few fine pores; slightly acid; clear wavy boundary.

B23g—22 to 32 inches; dark gray (10YR 4/1) fine sandy loam; many medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; friable; few fine roots; few fine pores; neutral; gradual boundary.

C1g—32 to 44 inches; dark grayish brown (10YR 4/2) loamy fine sand; common fine distinct yellowish

brown (10YR 5/6) mottles; single grain; loose; neutral gradual boundary.

C2g—44 to 50 inches; stratified gray (10YR 5/1) fine sandy loam and loamy fine sand; massive; friable; neutral.

The solum ranges from 30 to 40 inches in thickness. Depth to bedrock is more than 5 feet. Coarse fragments are less than 5 percent, by volume. Reaction increases as depth increases. It is medium acid to neutral in the A horizon, slightly acid to mildly alkaline in the B horizon, and neutral or mildly alkaline in the C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. A thin A2 horizon is below an A1 horizon in undisturbed areas.

The B horizon has hue of 5Y to 10YR, value of 4 to 6, and chroma of 1 to 4. It has distinct or prominent mottles. Texture is mainly sandy loam or fine sandy loam, but some subhorizons are loamy fine sand. The B horizon has prismatic structure or is massive. Consistence is very friable or friable.

The C horizon is stratified fine sand to very fine sandy loam in widely varying proportions. It is massive or single grain. Consistence is loose to friable.

Lordstown series

The Lordstown series consists of coarse-loamy, mixed, mesic Typic Dystrochrepts. These soils are moderately deep, well drained, and gently sloping to moderately steep. They are on glacially modified, bedrock controlled landforms. These soils formed in 20 to 40 inches of glacial till derived mainly from sandstone, siltstone, and shale. They have a medium textured subsoil. Slope ranges from 3 to 25 percent.

Lordstown soils are closely associated with the shallow, somewhat excessively drained to moderately well drained Arnot soils and the shallow, somewhat poorly drained and poorly drained Tuller soils that formed in material similar to that in which the Lordstown soils formed. Lordstown soils are similar in depth to bedrock as the Oquaga and Manlius soils that contain a higher content of coarse fragments. They are not so red as Oquaga soils and do not have the coarse fragments dominated by shale that Manlius soils have.

Typical pedon of Lordstown channery silt loam, in an area of Arnot-Lordstown-Rock outcrop complex, moderately steep, in the town of Olive, 160 feet northwest on Krumville Road from the intersection of Acorn Hill and Beaver Lake Roads and 100 feet north, in wooded area:

O1—1 to 1/2 inch; litter of leaves and twigs.

O2—1/2 inch to 0; very dark grayish brown (10YR 3/2) partly decomposed leaves and twigs; many fine roots; very strongly acid; abrupt wavy boundary.

A1—0 to 4 inches; dark brown (10YR 4/3) channery silt loam; weak fine granular structure; friable; many fine and common medium roots; 20 percent coarse fragments; strongly acid; abrupt wavy boundary.

B21—4 to 12 inches; yellowish brown (10YR 5/6) channery silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; common fine pores; 25 percent coarse fragments; strongly acid; gradual wavy boundary.

B22—12 to 26 inches; yellowish brown (10YR 5/6) channery silt loam; weak fine and medium subangular blocky structure; friable; common fine and medium roots; common fine pores; 25 percent coarse fragments; strongly acid; abrupt wavy boundary.

B3—26 to 32 inches; yellowish brown (10YR 5/4) channery loam; weak fine subangular blocky structure; friable; few fine and medium roots; common fine pores; 30 percent coarse fragments; strongly acid; abrupt smooth boundary.

IIR—32 inches; thick bedded gray sandstone and siltstone bedrock.

The solum ranges from 20 to 36 inches in thickness. Depth to bedrock ranges from 20 to 40 inches. Rock fragments are dominantly flat angular fragments and flagstones. They range from 15 to 35 percent, by volume, in the A and B horizons and from 20 to 60 percent in the C horizon.

The A1 horizon has hue of 10YR, value of 3 to 5, and chroma of 3. The fine earth is loam or silt loam. Reaction, in unlimed areas, is very strongly acid or strongly acid.

The B horizon has hue of 7.5YR to 2.5Y, value of 5, and chroma of 3 to 6. The fine earth is loam or silt loam. Structure is weak granular or subangular blocky. Consistence is very friable or friable. Reaction is very strongly acid or strongly acid.

A C horizon is present in some of the deeper pedons. It has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 or 3 with or without mottles of higher chroma. The fine earth is fine sandy loam to silt loam. Consistence is friable or firm. Reaction is strongly acid or medium acid.

Lyons series

The Lyons series consists of fine-loamy, mixed, nonacid, mesic Mollic Haplaquepts. These soils are deep, poorly drained and very poorly drained, and nearly level. They are in concave depressions within undulating to rolling till plains. These soils formed in calcareous glacial till derived mainly from limestone, calcareous shale, and calcareous sandstone. They have a moderately fine textured to moderately coarse textured subsoil. Slope ranges from 0 to 3 percent, but is dominantly 0 to 1 percent.

Lyons soils are in a drainage sequence with the well drained Bath soils, the moderately well drained Mardin soils, and the somewhat poorly drained Volusia soils. They are similar in drainage to Canandaigua and Ather-

ton soils. Lyons soils formed in glacial till, and Atherton soils formed in glacial outwash. Lyons soils have more sand and less silt than Canandaigua soils that formed in lacustrine deposits of silt, very fine sand, and clay.

Typical pedon of Lyons silt loam, in an area of Lyons-Atherton complex, very stony, in the town of Plattekill, about 1,650 feet southwest on Freetown Highway from the intersection of U.S. Route 44 and N.Y. Route 55 and 1,250 feet west, in wooded area:

A1—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; many fine dark reddish brown (5YR 3/3) root stains; moderate medium and coarse granular structure; friable; many fine roots; 5 percent coarse fragments; medium acid; clear smooth boundary.

B21g—9 to 18 inches; light gray (5Y 6/1) light clay loam; many fine distinct light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; firm; few fine roots; 10 percent coarse fragments; neutral; clear wavy boundary.

B22g—18 to 32 inches; light brownish gray (2.5Y 6/2) gravelly loam; many medium distinct light olive brown (2.5Y 5/6) and common fine distinct dark yellowish brown (10YR 4/4) mottles; weak very coarse prismatic structure parting to weak medium and coarse subangular blocky; firm; few fine roots; few fine pores; common oxide stains; 25 percent coarse fragments; neutral; gradual wavy boundary.

IIC—32 to 50 inches; dark grayish brown (10YR 4/2) gravelly loam; common fine and medium distinct pale olive (5Y 6/3) mottles; massive; firm; common fine pores; common oxide stains; 30 percent coarse fragments; moderately alkaline; calcareous.

The solum ranges from 25 to 40 inches in thickness. Depth to bedrock is more than 5 feet. The upper horizons are influenced in many places by local alluvial sediment that ranges from 0 to 24 inches in thickness. Rock fragments, mainly gravel, range from 5 to 30 percent, by volume, in the A and B horizons and from 20 to 50 percent in the C horizon.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Structure is moderate or strong granular. Reaction is medium acid to neutral.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2, but many mottles have a higher chroma. Texture of the fine earth is light silty clay loam to fine sandy loam. Structure is weak or moderate subangular blocky or prismatic. Reaction is slightly acid or neutral.

The C horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2, but mottles have higher chroma. The fine earth is fine sandy loam, loam, or silt loam. The C horizon has platy structure or is massive. Reaction is mildly alkaline or moderately alkaline.

Madalin series

The Madalin series consists of fine, illitic, mesic Mollic Ochraqualfs. These soils are deep, poorly drained and very poorly drained, and nearly level. They are within the basins of old glacial lakes. These soils formed in calcareous lacustrine deposits of clay and silt. They have a fine textured and moderately fine textured subsoil. Slope ranges from 0 to 2 percent, but is dominantly 0 to 1 percent.

Madalin soils most commonly are in a drainage sequence with the moderately well drained Hudson soils and the somewhat poorly drained Rhinebeck soils. They are also in a drainage sequence with the well drained and moderately well drained Cayuga soils and the somewhat poorly drained Churchville soils which are underlain with glacial till at a depth of 20 to 40 inches. Madalin soils are also closely associated in some areas with the moderately well drained to well drained Schoharie soils and the somewhat poorly drained Odessa soils which formed in redder lacustrine deposits.

Typical pedon of Madalin silty clay loam, in the town of Shawangunk, about 0.75 mile west of Bruynswick and 120 feet northeast of Meeker Road, in cropland:

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam; gray (10YR 5/1) dry; strong medium granular structure; friable; many fine roots; yellowish red (5YR 4/6) stains along roots; slightly acid; abrupt smooth boundary.

B21g—9 to 13 inches; dark gray (10YR 4/1) silty clay loam; common fine prominent yellowish red (5YR 5/6) mottles; moderate medium and coarse subangular blocky structure; very firm; many fine roots; few fine pores; neutral; clear wavy boundary.

B22tg—13 to 35 inches; dark gray (5Y 4/1) silty clay; many fine and medium prominent light yellowish brown (10YR 6/4) mottles; moderate coarse prismatic structure; very firm; few fine roots along structural faces; few fine pores; thin discontinuous gray (N 5/0) clay films on faces of peds; neutral; clear smooth boundary.

B3t—35 to 45 inches; brown (10YR 4/3) silty clay; common; fine distinct brown (7.5YR 5/2) mottles; weak coarse prismatic structure; firm; few fine pores; thin discontinuous gray (N 5/0) clay films on faces of peds; calcareous; mildly alkaline; clear smooth boundary.

C—45 to 50 inches; dark yellowish brown (10YR 4/4) varved silty clay and silty clay loam; many fine distinct brown (7.5YR 5/2) mottles; massive; firm; calcareous; mildly alkaline.

The thickness of the solum ranges from 27 to 48 inches, which coincides with the depth to carbonates. Depth to bedrock is more than 5 feet. Reaction is slightly acid or neutral in the A horizon, slightly acid to mildly

alkaline in the B horizon, and mildly alkaline in the C horizon.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1.

The B horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 or 2. Some pedons have chroma of 3 in the B3 horizon. Texture is silty clay or heavy silty clay loam. Structure is moderate angular or subangular blocky to moderate or strong coarse prismatic. Many pedons have weak structure in the B3 horizon. Consistence is firm or very firm.

The C horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 to 4. Texture is varved silty clay and silty clay loam with occasional lenses of silt loam.

Manlius series

The Manlius series consists of loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are moderately deep and well drained to excessively drained. They formed in glacial till derived mainly from shale on bedrock controlled landforms. The shale bedrock, at a depth of 20 to 40 inches, is folded and tilted at various angles. These soils are mainly on the Shawangunk Mountains and their foothills. They have a medium textured subsoil. Slope ranges from 3 to 65 percent, but is dominantly 5 to 45 percent.

Manlius soils are in a complex pattern with the shallow, somewhat excessively drained Nassau soils. They are similar to Lordstown and Oquaga soils in depth to bedrock, but they have a larger volume of shale fragments than these soils. Manlius soils also do not have the sandstone and siltstone bedrock that Lordstown and Oquaga soils have and the red colors that Oquaga soils have. They contain more coarse fragments and are shallower to bedrock than Valois soils.

Typical pedon of Manlius shaly silt loam, in an area of Nassau-Manlius complex, very steep, in the town of New Paltz, 0.45 mile south on the Private road from the main gate to the Mohonk Mountain House and 10 feet east, in wooded area:

O1—1-1/2 inches to 1 inch; litter of leaves, needles, and twigs.

O2—1 inch to 0; black (10YR 2/1) decomposed leaves, twigs, and needles; very friable; strongly acid; abrupt smooth boundary.

A1—0 to 2 inches; very dark brown (10YR 2/2) shaly silt loam; moderate fine granular structure; very friable; many fine and few medium roots; 20 percent shale fragments; strongly acid; clear wavy boundary.

B21—2 to 15 inches; light olive brown (2.5Y 5/4) shaly silt loam; weak fine and medium granular structure; very friable; many fine and few medium roots; 30 percent shale fragments; strongly acid; clear wavy boundary.

B22—15 to 22 inches; dark yellowish brown (10YR 4/4) very shaly silt loam; weak very fine granular structure; very friable; common fine roots; 70 percent shale fragments; strongly acid; gradual wavy boundary.

C—22 to 32 inches; a mass of fine shale fragments with thin brown (10YR 4/3) silt loam coatings; few fine roots; 95 percent shale fragments; medium acid; gradual wavy boundary.

IIR—32 inches; dark grayish brown (10YR 4/2) fractured rippable shale bedrock; beds tilted to nearly vertical.

Depth to bedrock ranges from 20 to 40 inches. The solum ranges from 16 to 30 inches in thickness. Rock fragments are dominantly shale with some siltstone. The content of rock fragments increase as depth increases and range from 15 to 35 percent, by volume, in the A horizon and from 20 to 75 percent in the B horizon. Average content is more than 35 percent between a depth of 10 and 40 inches. Reaction is extremely acid to strongly acid in the upper part of the solum and very strongly acid to medium acid at the contact with the bedrock.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3.

The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. The fine earth is loam or silt loam. Structure is weak or very weak granular or subangular blocky.

The C horizon has colors similar to the B horizon. The content of coarse fragments is usually higher than in the B horizon.

Mardin series

The Mardin series consists of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep, moderately well drained, and gently sloping and sloping. They are on till plains. These soils formed in glacial till derived mainly from sandstone, siltstone, and shale. A dense fragipan that restricts rooting is at a depth of 14 to 26 inches. These soils have a medium textured subsoil. Slope ranges from 3 to 15 percent, but is dominantly 3 to 12 percent.

Mardin soils are in a drainage sequence with the well drained Bath soils, the somewhat poorly drained Volusia soils, and the poorly drained and very poorly drained Lyons soils that formed in material similar to that in which Mardin soils formed. They have less depth to the fragipan than Bath soils. Mardin soils are similar to Wurtsboro and Wellsboro soils in classification and drainage. They have a higher content of silt and very fine sand above the fragipan than Wurtsboro soils. Mardin soils are not so red as Wellsboro soils. They have less clay in the upper part of the subsoil than Cambridge soils.

Typical pedon of Mardin gravelly silt loam, 3 to 8 percent slopes, in the town of Plattekill, 700 feet east on Barclay Road from its intersection with Plattekill Road and 1,150 feet north, in meadow:

Ap—0 to 10 inches; dark brown (10YR 4/3) gravelly silt loam; moderate fine granular structure; friable; many fine roots; 20 percent coarse fragments; medium acid; abrupt smooth boundary.

B21—10 to 14 inches; yellowish brown (10YR 5/6) gravelly silt loam; moderate fine and medium subangular blocky structure; friable; common fine roots; common fine pores; 15 percent coarse fragments; medium acid; clear wavy boundary.

B22—14 to 17 inches; yellowish brown (10YR 5/6) gravelly silt loam; common medium faint dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; 15 percent coarse fragments; medium acid; clear wavy boundary.

A'2—17 to 21 inches; pale brown (10YR 6/3) gravelly loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few fine roots; common fine pores; this horizon forms the tops of very coarse prisms; 15 percent coarse fragments; medium acid; clear broken boundary.

B'x—21 to 46 inches; olive brown (2.5Y 4/4) gravelly light loam; many medium distinct light brownish gray (2.5Y 6/2) mottles; weak very coarse prismatic structure; firm, brittle; few fine roots along faces of prisms; many vesicular pores with clay linings; prisms are separated by light yellowish brown (2.5Y 6/4) streaks with common fine distinct yellowish brown (10YR 5/6) borders; many oxide stains and concretions; 25 percent coarse fragments; slightly acid; gradual boundary.

C—46 to 56 inches; yellowish brown (10YR 5/4) gravelly loam; many medium faint light olive brown (2.5Y 5/6) and many medium prominent light brownish gray (2.5Y 6/2) mottles; massive; firm; 25 percent coarse fragments; neutral.

The solum ranges from 40 to 70 inches in thickness. Depth to the top of the fragipan ranges from 14 to 26 inches. Bedrock is at a depth of more than 60 inches, except it is more than 40 inches where these soils are in a complex pattern with Nassau soils. Rock fragments are mainly gravel, cobblestones, and stones; some flagstones are present and some fragments are angular. They range from 15 to 35 percent by volume in individual horizons above the fragipan and from 20 to 50 percent in the fragipan and C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 or 3. Structure is weak or moderate, fine or medium granular. Reaction, in unlimed areas, is very strongly acid to medium acid.

The B2 horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is mottled between depths of 12 and 26 inches. The fine earth is loam or silt loam. Structure is weak or moderate, fine or medium subangular blocky or granular. Consistence is very friable to firm. Reaction is very strongly acid to medium acid.

The A'2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 3. The fine earth is loam or silt loam. Structure is weak or very weak platy or subangular blocky. Consistence is friable or firm. Reaction is very strongly acid to medium acid.

The Bx horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. The fine earth is loam or silt loam. The prisms have massive interiors, or they part to subangular blocky or platy structure. Consistence is firm or very firm, and brittle. Reaction is very strongly acid to slightly acid.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. Texture of the fine earth is loam or silt loam. This horizon is massive or has weak platy structure. Reaction is strongly acid to moderately alkaline.

Menlo series

The Menlo series consists of coarse-loamy, mixed, mesic Aeric Fragiaquepts. These soils are deep, very poorly drained, and nearly level to depressional. They are in concave depressions on glaciated uplands. These soils formed in glacial till derived mainly from sandstone, conglomerate, and siltstone with a small amount of red shale. They are taxadjuncts to the Menlo series in this survey area because they have a yellower hue below the A horizon and have a Bx horizon instead of a Cx horizon. A dense fragipan that restricts root and water penetration is at a depth of 12 to 25 inches. These soils have a moderately coarse textured and medium textured subsoil. Slope ranges from 0 to 3 percent, but is dominantly 0 to 2 percent.

Menlo soils are in a drainage sequence with the well drained Swartswood soils, the moderately well drained Wurtsboro soils, and the somewhat poorly drained Scriba soils. Menlo soils formed in material similar to that in which those soils formed. They are also near Lackawanna, Wellsboro, and Morris soils in a few areas. Menlo soils are more acid and have a fragipan that is not present in the very poorly drained and poorly drained Lyons soils which formed in calcareous glacial till.

Typical pedon of Menlo silt loam, in an area of Menlo very bouldery soils, in the town of Denning, 1.1 miles northeast of Greenville School, in wooded area:

O1—3 to 2 inches; litter of leaves, needles, and twigs.

O2—2 inches to 0; black (N 2/0) partly decomposed leaves, needles, and twigs; many fine and few medium roots; extremely acid; abrupt wavy boundary.

A1—0 to 2 inches; black (N 2/0) silt loam; moderate fine granular structure; very friable; few medium and many fine roots; high organic matter content; 10 percent coarse fragments; extremely acid; abrupt wavy boundary.

A2g—2 to 13 inches; light gray (10YR 7/1) gravelly fine sandy loam; many fine and medium distinct yellowish brown (10YR 5/6) and common fine distinct brownish yellow (10YR 6/6) mottles; weak thick platy structure; friable; few fine roots; few fine pores; 15 percent coarse fragments; very strongly acid; clear wavy boundary.

Bx—13 to 30 inches; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; many medium faint brown (10YR 5/3) mottles; weak very coarse prismatic structure parting to weak thick platy; very firm, brittle; thin clay films in common fine pores; prisms are separated by grayish brown (10YR 5/2) streaks with yellowish brown (10YR 5/6) borders; common oxide stains; 25 percent coarse fragments; medium acid; gradual wavy boundary.

C—30 to 50 inches; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; massive; firm; few fine pores; 30 percent coarse fragments; slightly acid.

Depth to the fragipan is 12 to 25 inches. The solum ranges from 25 to 55 inches in thickness. Depth to bedrock is more than 5 feet. Rock fragments are angular and subrounded sandstone, conglomerate, siltstone, or shale. They range from 5 to 35 percent, by volume, in individual horizons in the solum and from 15 to 35 percent in the C horizon. Reaction, in unlimed areas, increases as depth increases and is extremely acid to medium acid in the A horizon and strongly acid to slightly acid in the Bx and C horizons.

The A1 or Ap horizon has hue of 10YR or it is neutral and has value of 2 and chroma of 0 to 2. The fine earth is silt loam, loam, or fine sandy loam.

The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2 but has mottles of higher chroma. The fine earth is fine sandy loam, silt loam, or loam. Structure is weak platy or subangular blocky.

The Bx horizon has hue of 2.5Y to 5YR, value of 4 or 5, and chroma of 3 or 4. The fine earth is fine sandy loam, loam, or silt loam. Prisms have massive, platy, or subangular blocky interiors. Consistence is firm or very firm and brittle.

The C horizon is similar to the Bx in color, but is less brittle and is platy or massive. The fine earth is silt loam, loam, or fine sandy loam.

Middlebury series

The Middlebury series consists of coarse-loamy, mixed, mesic Fluvaquentic Eutrochrepts. These soils are deep, moderately well drained to somewhat poorly drained, and nearly level. They are on flood plains. These soils formed in alluvium derived from shale and sandstone with some lime-bearing materials. These soils have a medium textured and moderately coarse textured subsoil. Slope ranges from 0 to 2 percent, but is dominantly 0 to 1 percent.

Middlebury soils are in a drainage sequence with the well drained Tioga soils and the poorly drained and very poorly drained Wayland soils. Middlebury soils are in positions on flood plains similar to those of the moderately well drained to somewhat poorly drained Teel and Basher soils. They contain less silt and very fine sand between a depth of 10 and 40 inches than Teel soils. Middlebury soils do not have the red colors that Basher soils have, and they have a higher base status than these soils.

Typical pedon of Middlebury silt loam, in the town of Rochester, about 1 mile northwest on Boice Mill Road from its intersection with U.S. Route 209 and about 1,320 feet southwest, in cropland:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; moderate fine granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

B21—8 to 13 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; common fine roots; many fine pores; slightly acid; clear wavy boundary.

B22—13 to 20 inches; dark yellowish brown (10YR 4/4) loam; common fine faint brown (10YR 5/3) mottles; weak medium and coarse subangular blocky structure; friable; few fine roots; common fine pores; slightly acid; clear wavy boundary.

B23—20 to 25 inches; dark brown (10YR 4/3) fine sandy loam; many medium distinct grayish brown (2.5Y 5/2) mottles; weak coarse subangular blocky structure; very friable; few fine roots; common fine pores; neutral; clear wavy boundary.

C1—25 to 31 inches; dark brown (10YR 4/3) fine sandy loam; many medium distinct grayish brown (2.5Y 5/2) mottles; massive; very friable; common fine pores; neutral; clear wavy boundary.

C2—31 to 43 inches; yellowish brown (10YR 5/4) sandy loam; many fine and medium distinct grayish brown (2.5Y 5/2) mottles; massive; very friable; common fine pores; neutral; gradual wavy boundary.

IIC3—43 to 52 inches; grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) stratified gravelly sandy loam; single grain; very friable; 25 percent coarse fragments; neutral.

The solum ranges from 16 to 27 inches in thickness. Depth to bedrock is more than 5 feet. Coarse fragments are generally absent but range to 20 percent, by volume, in individual horizons between the A horizon and 40 inches. Reaction, in unlimed areas, increases as depth increases and is strongly acid or medium acid in the A

horizon and medium acid to neutral within 40 inches of the surface.

The Ap horizon has hue of 2.5Y or 10YR, value of 3 or 4, and chroma of 2 or 3.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4. Texture is fine sandy loam to silt loam. Structure is weak medium or coarse subangular blocky, or weak medium prismatic. Consistence is friable or very friable.

The C horizon has hue of 7.5YR to 5Y, value of 4 or 5, and chroma of 2 to 4. Texture below a depth of 40 inches is variable and is silt loam to stratified gravelly sandy loam. The C horizon is platy, massive, or single grain. Consistence is friable or very friable.

Morris series

The Morris series consists of coarse-loamy, mixed, mesic Aeric Fragiaquepts. These soils are deep, somewhat poorly drained, and nearly level and gently sloping. They are on uniform to slightly concave side slopes on glaciated uplands. These soils formed in glacial till derived mainly from reddish sandstone, siltstone, and shale. A dense fragipan that restricts water and root penetration is at a depth of 12 to 22 inches. These soils dominantly have a medium textured subsoil. Slope ranges from 0 to 8 percent.

Morris soils are in a drainage sequence with the well drained Lackawanna soils and the moderately well drained Wellsboro soils. They are also near the very poorly drained Menlo soils and are in a complex pattern with the somewhat poorly drained to poorly drained Tuller soils. Tuller soils have bedrock at a depth of 10 to 20 inches and do not have a fragipan. Morris soils are similar in drainage to Volusia and Scriba soils that also formed in glacial till, but are redder than these soils. Morris soils also have a lower content of clay above the fragipan than Volusia soils and less sand in the subsoil than Scriba soils.

Typical pedon of Morris flaggy silt loam, in an area of Scriba and Morris very bouldery soils, gently sloping, in the town of Woodstock, 0.5 mile west on Jessop Road from the intersection of Van Wagner and Silver Hollow Roads and 75 feet south, in wooded area:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) flaggy silt loam; moderate medium granular structure; friable; many fine and common medium roots; 15 percent coarse fragments; medium acid; abrupt smooth boundary.

B21g—6 to 10 inches; grayish brown (10YR 5/2) flaggy silt loam; many medium faint reddish brown (5YR 5/3) and common fine distinct yellowish red (5YR 4/6) mottles; weak medium and coarse subangular blocky structure; friable; common fine roots; few fine pores; 15 percent coarse fragments; medium acid; clear irregular boundary.

B22—10 to 13 inches; reddish brown (5YR 4/4) gravelly loam; many medium and coarse prominent grayish brown (10YR 5/2) and common medium distinct dark red (2.5YR 3/6) mottles; weak coarse subangular blocky structure; firm; few fine roots; few fine pores; 15 percent coarse fragments; medium acid; clear broken boundary.

Bx—13 to 65 inches; reddish brown (5YR 4/4) gravelly loam; common fine distinct strong brown (7.5YR 5/6) mottles; strong very coarse prismatic structure with massive interiors; very firm, brittle; few fine roots along faces of prisms; thin light brownish gray (10YR 6/2) clay films in common fine vesicular pores; prisms are separated by dark gray (10YR 4/1) fine sandy loam streaks with strong brown (7.5YR 5/6) borders; 20 percent coarse fragments; medium acid in the upper 20 inches, slightly acid below; diffuse wavy boundary.

C—65 to 80 inches; reddish brown (5YR 4/4) gravelly loam; massive; firm; few fine vesicular pores; 20 percent coarse fragments; slightly acid.

The solum ranges from 40 to 75 inches in thickness. Depth to the fragipan ranges from 12 to 22 inches. Depth to bedrock is more than 5 feet. Rock fragments of angular or subrounded sandstone, siltstone, or shale range from 15 to 35 percent, by volume, in individual horizons above the fragipan and from 15 to 45 percent in the Bx and C horizons. Reaction is very strongly acid to medium acid in the A and B2 horizons and in the upper part of the Bx horizon and strongly acid to slightly acid in the lower part of the Bx horizon and in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 1 or 2. The fine earth is loam or silt loam. In undisturbed pedons the A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2.

The A2 horizon, if present, has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 or 3.

The B2 horizon has hue of 5YR, to 10YR, value of 3 to 5, and chroma of 2 to 4 with mottles. The fine earth is loam or silt loam. Structure is weak blocky, granular, or platy. Consistence is friable or firm.

The Bx horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 4 and is commonly mottled with gray or brown. The fine earth is loam to light silty clay loam. The very coarse prisms of the fragipan have massive, platy, or subangular blocky interiors. Consistence is firm or very firm, and brittle.

The C horizon is similar to the Bx horizon in color. The fine earth is loam or silt loam. The C horizon is massive or platy.

Nassau series

The Nassau series consists of loamy-skeletal, mixed, mesic Lithic Dystrochrepts. These soils are shallow (fig.

11) and somewhat excessively drained. They formed in glacial till derived mainly from shale and slate. These soils are on bedrock controlled, glacially modified landforms. The bedrock is folded and tilted at various angles, and bedrock outcrops are common. These soils have a medium textured subsoil. Slope ranges from 3 to 65 percent, but is dominantly 8 to 60 percent.

Nassau soils are closely associated with the moderately deep, well drained to excessively drained Manlius soils and the deep, well drained Bath soils and moderately well drained Mardin soils. Nassau soils do not have the angular fragments and flagstones derived mainly from siltstone and sandstone that Arnot soils have. They have a lower base status and more coarse fragments in the solum than Farmington soils that are shallow to limestone bedrock.

Typical pedon of Nassau shaly silt loam, in an area of Bath-Nassau complex, 8 to 25 percent slopes, in the town of New Paltz, 2,300 feet northwest on Jansen Road from its intersection with N.Y. Route 32 and 20 feet north, in an apple orchard:

Ap—0 to 6 inches; brown (10YR 4/3) shaly silt loam; moderate fine granular structure; very friable; many fine roots; 25 percent shale fragments; strongly acid; abrupt smooth boundary.

B21—6 to 10 inches; yellowish brown (10YR 5/4) very shaly silt loam; weak very fine subangular blocky structure; very friable; many fine roots; many fine pores; 35 percent shale fragments; strongly acid; abrupt smooth boundary.

B22—10 to 16 inches; brown (7.5YR 4/4) very shaly silt loam; weak fine and medium subangular blocky structure; friable; many fine roots; many fine pores; 50 percent shale fragments; strongly acid; abrupt irregular boundary.

IIR—16 inches; dark gray (N 4/0) shale with cleavage planes tipped almost vertically.

The thickness of the solum ranges to a depth of 10 to 20 inches and coincides to the depth to bedrock. Rock fragments are derived mainly from shale and slate. They range from 15 to 50 percent, by volume, in the Ap horizon and from 35 to 70 percent in the B horizon. Reaction, in unlimed areas, is very strongly acid or strongly acid throughout.

The Ap horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 or 3. Structure is weak or moderate, medium or fine granular.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The fine earth is silt loam or loam. The B horizon has weak subangular blocky structure, or it is massive. Consistence is friable or very friable. In some profiles, a thin horizon above the bedrock has more than 90 percent loose shale fragments.

Odessa series

The Odessa series consists of fine, illitic, mesic Aeric Ochraqualfs. These soils are deep, somewhat poorly drained, and nearly level and gently sloping. They are on glacial lake plains. These soils formed in calcareous lacustrine deposits of clay and silt. They have a fine textured and moderately fine textured subsoil. Slope ranges from 0 to 8 percent.

Odessa soils are closely associated with the moderately well drained to well drained Schoharie soils, and in some areas, with the poorly drained and very poorly drained Madalin soils. They are similar in texture and drainage to Rhinebeck and Churchville soils, but are redder than Rhinebeck soils and do not have glacial till below a depth of 20 to 40 inches, which Churchville soils have. Odessa soils have a finer textured solum than Raynham soils that formed in water-laid deposits of coarse silt and very fine sand.

Typical pedon of Odessa silt loam, 0 to 3 percent slopes, in the town of Rochester, about 1.7 miles north-northeast of Kerhonkson, 1,980 feet northeast of intersection of Boice Mill and Mill Brook Roads, in cropland:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; light gray (10YR 7/2) dry; moderate medium granular structure; firm; many fine roots; neutral; abrupt wavy boundary.

B&A—8 to 12 inches; yellowish brown (10YR 5/6) silty clay loam; many fine distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; firm; common fine roots; many fine pores; grayish brown (10YR 5/2) silt coatings on vertical faces of peds; slightly acid; clear wavy boundary.

B21t—12 to 17 inches; brown (7.5YR 5/4) silty clay loam; many fine distinct brown (10YR 5/3) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; many fine pores; continuous grayish brown (10YR 5/2) clay films on vertical faces of peds; slightly acid; clear wavy boundary.

B22t—17 to 22 inches; dark brown (7.5YR 4/4) silty clay; many fine distinct brown (7.5YR 5/2) mottles; moderate coarse prismatic structure parting to moderate coarse angular blocky; very firm; common fine roots; many fine pores; continuous brown (7.5YR 5/2) clay films on faces of peds and in pores; common very dark gray (10YR 3/1) oxide stains; medium acid; clear wavy boundary.

B23t—22 to 26 inches; reddish brown (5YR 4/4) silty clay; many fine distinct reddish gray (5YR 5/2) mottles; moderate coarse prismatic structure parting to moderate coarse angular blocky; very firm; few fine roots; many fine pores; continuous thin reddish gray (5YR 5/2) clay films on faces of peds and in pores; common very dark gray (10YR 3/1) oxide stains; neutral; clear wavy boundary.

B24t—26 to 34 inches; dark brown (7.5YR 4/4) silty clay; many fine distinct reddish gray (5YR 5/2) mottles; weak coarse prismatic structure parting to weak coarse angular blocky; very firm; few fine roots mainly on faces of peds; many fine pores; continuous thin gray (5YR 5/1) clay films on faces of peds and in pores; common very dark gray (10YR 3/1) oxide stains; neutral; clear wavy boundary.

B3—34 to 38 inches; varved reddish brown (2.5YR 4/4) silty clay and yellowish brown (10YR 5/4) silty clay loam; weak coarse prismatic structure; very firm; few fine roots on faces of peds; few fine pores; thin gray (5YR 5/1) clay films on faces of prisms; calcareous; mildly alkaline; clear wavy boundary.

C—38 to 50 inches; varved reddish brown (2.5YR 4/4) silty clay and yellowish brown (10YR 5/4) silty clay loam; massive; very firm; calcareous; mildly alkaline.

The solum ranges from 24 to 45 inches in thickness. Depth to carbonates ranges form 20 to 45 inches. Depth to bedrock is more than 5 feet. Coarse fragments range from 0 to 5 percent, by volume, throughout.

The Ap horizon has hue of 5YR to 10YR, value of 3 to 5 moist and 6 or 7 dry, and chroma of 2. Reaction is medium acid to neutral.

An A2 horizon, as much as 4 inches thick, is present in some pedons where it was not mixed by plowing. Texture is silt loam or silty clay loam.

The B&A horizon is absent in some pedons.

The B2 horizon mainly has hue of 2.5YR or 5YR, but hue is 7.5YR in some subhorizons. It has value of 4 or 5, chroma of 2 to 4, and has mottles. Texture of the B2 horizon is heavy silty clay loam or silty clay. Structure is weak to strong, medium or coarse prismatic, or medium or coarse angular or subangular blocky. Consistence is firm or very firm. Reaction is medium acid to mildly alkaline.

The B3 horizon, if present, has weak or moderate coarse prismatic structure. Consistence of the B3 horizon is firm or very firm. Reaction is neutral or mildly alkaline.

The C horizon is massive or has weak thick platy structure. It is mildly alkaline or moderately alkaline.

Oquaga series

The Oquaga series consists of loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are moderately deep, well drained to excessively drained, and gently sloping to very steep. They are on glacially modified, bedrock controlled landforms. These soils formed in 20 to 40 inches of glacial till derived mainly from reddish sandstone, siltstone, and shale. They have a medium textured subsoil. Slope ranges from 3 to 70 percent, but is dominantly 8 to 60 percent.

Oquaga soils are closely associated with the shallow, somewhat excessively drained to moderately well drained Arnot soils and the shallow, somewhat poorly drained to poorly drained Tuller soils. They are similar to Lordstown and Manlius soils in depth to bedrock. Oquaga soils are redder and contain a higher content of coarse fragments than Lordstown soils. They do not have the coarse fragments dominated by shale that Manlius soils have.

Typical pedon of Oquaga channery silt loam, in an area of Oquaga-Arnot-Rock outcrop complex, moderately steep, in the town of Woodstock, about 1.35 miles north on Meads Mountain Road from its intersection with California Quarry Road and 990 feet northeast, in wooded area:

O1—3 to 1-1/2 inches; litter of leaves and twigs.

O2—1-1/2 inches to 0; very dark grayish brown (10YR 3/2) humus matting; many fine roots; extremely acid; clear smooth boundary.

B21—0 to 5 inches; strong brown (7.5YR 5/6) channery silt loam; weak fine and very fine granular structure; very friable; many fine and few coarse roots; 20 percent coarse fragments; very strongly acid; clear smooth boundary.

B22—5 to 12 inches; yellowish red (5YR 5/6) channery loam; very weak fine subangular blocky structure parting to weak very fine granular; very friable; many fine and few coarse roots; many fine pores; 25 percent coarse fragments; very strongly acid; clear wavy boundary.

B23—12 to 25 inches; yellowish red (5YR 4/6) channery loam; very weak fine subangular blocky structure parting to weak very fine granular; friable; many fine and few coarse roots; many fine pores; 35 percent coarse fragments; very strongly acid; clear wavy boundary.

IIC—25 to 32 inches; reddish brown (5YR 4/4) very gravelly loam; massive; firm; few fine roots in upper part; many fine pores; 45 percent coarse fragments; very strongly acid; abrupt smooth boundary.

IIIR—32 inches; olive gray (5Y 5/2) sandstone bedrock.

The thickness of the solum ranges to a depth of 20 to 40 inches and coincides with the depth to bedrock. Rock fragments, dominantly flat angular fragments and flagstones, increase as depth increases. They range from 15 to 30 percent, by volume, in the A horizon and upper part of the B horizon and from 35 to 70 percent in the lower part of the B horizon and in the C horizon. Reaction, in unlimed areas, is extremely acid to medium acid throughout.

Forested areas have an O2 horizon, 1/2 inch to 3 inches thick, directly above the B horizon or thin A1 and A2 horizons between the O2 horizon and the B horizon. The A1 horizon has hue of 2.5YR to 7.5YR, value of 3, and chroma of 2 to 4.

The B horizon has hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 3 to 6. The fine earth is silt loam or

loam. Structure is weak or very weak granular or subangular blocky.

The C horizon has colors similar to the B horizon. Some pedons have mottles directly above the bedrock. The fine earth is silt loam to fine sandy loam.

Palms series

The Palms series consists of loamy, mixed, euic, mesic Terric Medisaprists. These soils are deep, very poorly drained, nearly level to depressional, and organic. They are in basins that were formerly glacial lakes or ponds. These soils formed in 16 to 50 inches of well decomposed organic material over loamy mineral material. The prolonged high water table has inhibited the oxidation of remnants of such plants as mosses, sedges, and some woody plants. Slope is generally less than 2 percent.

Palms soils are on landscapes similar to those of Carlisle soils that formed in organic deposits more than 51 inches thick. They are associated with Canandaigua, Lyons, Menlo, Wayland, Lamson, Madalin, and Atherton soils that formed in mineral materials at the margin of bogs. Palms soils are deeper to bedrock than Palms, bedrock variant soils.

Typical pedon of Palms muck, in the town of Marbletown, about 0.88 mile west on Scarawan Road from its intersection with Peak Road and 0.25 mile south, in wooded area:

Oa1—0 to 7 inches; very dark brown (10YR 2/2) broken face and rubbed, muck; weak coarse granular structure; very friable; many fine roots; 3 percent fiber undisturbed; no fiber rubbed; 10 percent mineral content; very strongly acid; abrupt smooth boundary.

Oa2—7 to 21 inches; very dark brown (10YR 2/2) broken face and rubbed, muck; massive; friable, slightly sticky, slightly plastic; 15 percent fiber undisturbed; less than 3 percent fiber rubbed; 25 percent mineral content; strongly acid; abrupt smooth boundary.

Oa3—21 to 44 inches; very dark brown (10YR 2/2) broken face and rubbed, muck; massive; slightly sticky, slightly plastic; 20 percent fiber undisturbed; less than 3 percent fiber rubbed; 40 percent mineral content; medium acid; abrupt wavy boundary.

IICg—44 to 56 inches; dark gray (10YR 4/1) sandy clay loam; massive; firm; neutral.

The underlying loamy mineral soil is typically at a depth of 20 to 44 inches but ranges in depth from 16 to 50 inches. Depth to bedrock is more than 5 feet. The fiber content is mainly derived from herbaceous plants and has less than 15 percent woody material.

The Oa1 horizon has hue of 10YR, value of 2, and chroma of 1 or 2. It is massive or has weak granular or subangular blocky structure. Reaction is very strongly acid to neutral.

The Oa2 and Oa3 horizons have hue of 10YR to 5YR, value of 2 or 3, and chroma of 0 to 2. Chroma and value can vary 1 or 2 units when the soil is rubbed. These horizons are massive or have weak granular or subangular blocky structure. Mineral material increases as depth increases and ranges from 30 to 50 percent in the Oa3 horizon. Reaction increases as depth increases and is strongly acid to neutral.

The C horizon has hue of 10YR or 2.5Y, value of 3 or 5, and chroma of 1 or 2. Texture is variable; it is fine sandy loam to clay loam. Reaction is slightly acid to moderately alkaline.

Palms, Bedrock Variant

The Palms, bedrock Variant, consists of euic, mesic Lithic Medisaprists. These soils are nearly level to depressional, very poorly drained, and organic. They are in basins on bedrock controlled landforms where bedrock is at a depth of 20 to 50 inches. These soils formed in well decomposed organic deposits over loamy mineral materials and sandstone, siltstone, shale, or conglomerate bedrock. The prolonged high water table has inhibited the oxidation of remnants of such plants as mosses, sedges, and some woody plants. Slope is generally less than 2 percent.

Palms, bedrock Variant soils are associated with Arnot, Tuller, Lordstown, and Oquaga soils on bedrock-controlled landforms. They are similar in texture and drainage to Carlisle soils and deeper Palms soils where bedrock is below a depth of 60 inches. Palms, bedrock Variant soils formed in a thinner organic deposit than Carlisle soils.

Typical pedon of Palms muck, bedrock Variant, in the town of Olive, about 1.35 miles southwest of Krumville and 200 feet north of an unnamed road that crosses the Beaverdam Creek, in idle area:

Oa1—0 to 8 inches; black (10YR 2/1) broken face, pressed, and rubbed, muck; moderate medium granular structure; very friable; many fine roots; 3 percent fiber undisturbed; less than 1 percent rubbed; 15 percent mineral content; strongly acid; abrupt, smooth boundary.

Oa2—8 to 26 inches; black (10YR 2/1) broken face, pressed, and rubbed, muck; weak medium granular structure; nonsticky, slightly plastic; 80 percent fiber undisturbed; 10 percent rubbed; medium acid; abrupt smooth boundary.

Oa3—26 to 30 inches; olive gray (5Y 4/2) broken face and pressed and dark olive gray (5Y 3/2) rubbed, muck; massive; nonsticky, slightly plastic; medium acid; abrupt wavy boundary.

IICg—30 to 38 inches; dark gray (5Y 4/1) very gravelly loam; massive; friable; 60 percent gravel; neutral; abrupt smooth boundary.
IIIR—38 inches; gray sandstone bedrock.

Depth to sandstone, siltstone, shale, and conglomerate bedrock ranges from 20 to 50 inches. The fiber is mainly derived from herbaceous plants and less than 15 percent is woody. Reaction generally increases as depth increases. It is strongly acid to neutral in the Oa1 horizon to slightly acid or neutral above the bedrock.

The Oa1 horizon has hue of 10YR, value of 2, and chroma of 1 or 2. Structure is weak or moderate granular.

The Oa2 and Oa3 horizons have hue of 10YR to 5Y, value of 2 to 4, and chroma of 0 to 2. Chroma and value can vary 1 or 2 units when the soil is rubbed. These horizons are commonly massive, but some pedons have weak granular or subangular blocky structure.

The C horizon is 2 to 20 inches thick. It has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2. Texture is variable and is silty clay loam to gravelly fine sandy loam or very gravelly loam.

Plainfield series

The Plainfield series consists of mixed, mesic Typic Udipsamments. These soils are deep, excessively drained, and nearly level to very steep. They are predominantly on deltas and outwash plains. These soils formed in water-laid deposits of dominantly medium and coarse sand. They have a coarse textured subsoil. Slope ranges from 0 to 60 percent, but is dominantly 0 to 50 percent.

Plainfield soils are in the same topographic position as the well drained Riverhead soils but are coarser textured than these soils. They are similar to Suncook and Hoosic soils in drainage. Plainfield soils have a thicker solum than Suncook soils and a coarser textured solum that has considerably less gravel than Hoosic soils.

Typical pedon of Plainfield loamy sand, 0 to 8 percent slopes, in Tillson in the town of Rosendale, 150 feet south on N.Y. Route 32 from its intersection with Orchard Avenue and 60 feet east, in idle area:

Ap—0 to 9 inches; dark brown (10YR 4/3) loamy sand; very weak very fine granular structure; very friable; many fine roots; strongly acid; abrupt smooth boundary.
B21—9 to 23 inches; brown (7.5YR 4/4) loamy sand; very weak very fine granular structure; friable; many fine roots; many fine pores; strongly acid; gradual wavy boundary.
B22—23 to 32 inches; brown (7.5YR 4/4) loamy coarse sand; single grain; loose; common fine roots; many fine pores; strongly acid; clear wavy boundary.
IIC—32 to 65 inches; brown (10YR 4/3) coarse sand; single grain; loose; few fine roots in upper 5 inches; 5 percent fine gravel; strongly acid.

The solum ranges from 20 to 34 inches in thickness. Depth to bedrock is more than 5 feet. Fine gravel ranges from 0 to 5 percent, by volume, throughout. Reaction, in unlimed areas, is very strongly acid to medium acid throughout.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Texture is loamy fine sand or loamy sand.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. Texture is sand, loamy coarse sand, or loamy sand. Consistence is friable to loose.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

Based on current concepts, the soils named as Plainfield are more similar to Windsor soils than to Plainfield soils and have the same interpretations as Windsor soils.

Pompton series

The Pompton series consists of coarse-loamy, mixed, mesic Aquic Dystrochrepts. These soils are deep, moderately well drained, and nearly level. They are on deltas and outwash plains. These soils formed in water-sorted sandy sediment. They have a moderately coarse textured subsoil. Slope ranges from 0 to 3 percent, but is dominantly 0 to 2 percent.

Pompton soils are in a drainage sequence with the well drained Riverhead soils, the somewhat poorly drained Walpole soils, and the poorly drained and very poorly drained Lamson soils. Pompton soils formed in material similar to that in which those soils formed. They are similar to Scio, Williamson, and Castile soils in drainage. Pompton soils have a coarser textured solum than Scio and Williamson soils and contain less gravel in their solum than Castile soils. In addition, Pompton soils do not have the fragipan that Williamson soils have.

Typical pedon of Pompton fine sandy loam, in the town of Saugerties, about 1.5 miles south of the Village of Saugerties, 250 feet north of the intersection of N.Y. Route 32 and U.S. Route 9W and 1,650 feet east, in wooded area:

O1—1 inch to 0; litter of leaves and twigs.
Ap—0 to 9 inches; dark brown (10YR 3/3) fine sandy loam; moderate fine and very fine granular structure; very friable; many fine and few coarse roots; many brown (7.5YR 4/4) root stains; strongly acid; clear smooth boundary.
B21—9 to 19 inches; dark brown (7.5YR 4/4) sandy loam; weak medium and coarse subangular blocky structure; very friable; common fine and few coarse

roots; many fine pores; strongly acid; clear wavy boundary.

B22—19 to 29 inches; yellowish brown (10YR 5/4) sandy loam; common fine faint yellowish brown (10YR 5/6) and common fine distinct dark grayish brown (10YR 4/2) mottles; weak medium and coarse subangular blocky structure; very friable; few fine roots; many fine pores; common dark brown (10YR 3/3) oxide concretions and stains; strongly acid; clear wavy boundary.

C1—29 to 44 inches; light brownish gray (10YR 6/2) loamy sand; many coarse distinct yellowish brown (10YR 5/4) and common medium prominent brown (7.5YR 4/4) mottles; single grain; loose; few fine roots; many fine pores; strongly acid; clear wavy boundary.

C2—44 to 50 inches; light brownish gray (2.5Y 6/2) loamy fine sand; common fine distinct yellowish brown (10YR 5/4) mottles; massive; very friable; strongly acid; abrupt boundary.

IIC3—50 to 61 inches; stratified brown (7.5YR 5/2), yellowish brown (10YR 5/6), and olive gray (5Y 5/2) loamy sand and sandy loam; massive and single grain; very friable and loose; strongly acid.

The solum ranges from 24 to 36 inches in thickness. Depth to bedrock is more than 5 feet. Coarse fragments are typically absent, but range from 0 to 5 percent, by volume, in the C horizon. Reaction in unlimed areas, is very strongly acid or strongly acid throughout.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. In some undisturbed pedons, a thin A2 horizon is below an A1 horizon.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 6. This horizon has mottles with a chroma of 2 or less in the lower part, above a depth of 24 inches. Texture is sandy loam or fine sandy loam. Structure is subangular blocky or granular. Consistence is friable or very friable.

The C horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 2 to 4. It is stratified with sandy loam to sand.

Raynham series

Raynham series consists of coarse-silty, mixed, nonacid, mesic Aeric Haplaquepts. These soils are deep, somewhat poorly drained, and nearly level. They are on glacial-stream terraces and lake plains and in upland basins formerly occupied by glacial lakes. These soils formed in water-laid deposits of coarse silt and very fine sand. They have a medium textured subsoil. Slope ranges from 0 to 3 percent, but is dominantly 0 to 2 percent.

Raynham soils are in a drainage sequence with the well drained Unadilla soils, the moderately well drained Scio soils, and the poorly drained and very poorly drained Canandaigua soils. They are also associated with the moderately well drained Williamson soils that have a fragipan. Raynham soils are similar to Rhinebeck and Walpole soils in drainage. They are coarser textured than Rhinebeck soils and have a higher proportion of silt and very fine sand in their solum than Walpole soils.

Typical pedon of Raynham silt loam, in the town of Ulster, about 0.35 mile west on Esopus Avenue from its intersection with Albany Avenue and 1,500 feet north, in cropland:

Ap—0 to 8 inches; dark grayish brown (2.5Y 4/2) silt loam; moderate fine and medium granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

A2—8 to 12 inches; grayish brown (2.5Y 5/2) silt loam; moderate medium and coarse granular structure; friable; many fine roots; many root and worm channels; medium acid; abrupt smooth boundary.

B21g—12 to 22 inches; grayish brown (2.5Y 5/2) silt loam; common fine distinct light olive brown (2.5Y 5/6) and common fine faint light brownish gray (2.5Y 6/2) mottles; weak coarse prismatic structure parting to moderate coarse subangular blocky; friable; many fine roots; common fine pores; many root and worm channels; medium acid; abrupt smooth boundary.

B22—22 to 32 inches; pale olive (5Y 6/3) silt loam; common medium prominent strong brown (7.5YR 5/6) and common fine distinct light olive brown (2.5Y 5/6) mottles; moderate coarse prismatic structure; firm; common fine roots along faces of peds; many fine pores; very thin discontinuous light olive gray (5Y 6/2) silt coatings on vertical faces of peds; medium acid; clear smooth boundary.

IIB23—32 to 37 inches; reddish brown (5YR 5/3) silt loam; many medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; firm; few fine roots; silt coatings in common fine pores; medium acid; clear smooth boundary.

IIC1—37 to 48 inches; reddish brown (5YR 5/3) very fine sandy loam; many fine distinct yellowish brown (10YR 5/4) and common fine distinct strong brown (7.5YR 5/6) mottles; massive; friable; few fine roots; common fine pores; slightly acid; clear smooth boundary.

IIIC2—48 to 56 inches; reddish brown (5YR 5/3) silt loam; common medium distinct strong brown (7.5YR 5/6) and common medium distinct yellowish red (5YR 5/6) mottles along root channels; massive; firm; few fine pores; slightly acid.

The solum ranges from 22 to 38 inches in thickness. Depth to bedrock is more than 5 feet. The solum is typically free of coarse fragments, but in some places a few pebbles are on the surface or in the soil. Reaction is

strongly acid to slightly acid in the A and B horizons and medium acid to neutral in the C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. The A2 horizon is absent in some profiles.

The B horizon has hue of 5YR to 5Y, value of 4 to 6, and chroma of 2 to 4. Texture is silt loam or very fine sandy loam. Structure is weak or moderate prismatic, platy, subangular blocky, or granular.

The C horizon has hue of 5YR to 5Y, value of 4 to 6, and chroma of 1 to 3. Texture is silt loam or very fine sandy loam. This horizon is massive or has inherited platiness where the parent material is varved.

Red Hook series

The Red Hook series consists of coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts. These soils are deep, somewhat poorly drained, and nearly level. They are on glacial outwash terraces, older stream terraces, and water-sorted moraines. These soils formed in glacial outwash deposits over stratified material. They have a medium textured and moderately coarse textured subsoil. Slope ranges from 0 to 3 percent, but is dominantly 0 to 2 percent.

Red Hook soils are commonly associated with the poorly drained to very poorly drained Atherton soils, the moderately well drained Castile soils, the well drained to somewhat excessively drained Chenango and Tunkhannock soils, and the somewhat excessively drained Hoosic soils. Red Hook soils are similar to the more sandy Walpole soils in drainage, but contain more coarse fragments between a depth of 10 and 40 inches than these soils.

Typical pedon of Red Hook gravelly silt loam, in the town of Marlboro about 740 feet south on Lattintown Road from its intersection with Old Indian Road and 245 feet east, in cropland:

Ap—0 to 8 inches; brown (10YR 4/3) gravelly silt loam; moderate very fine granular structure; very friable; many fine roots; 20 percent coarse fragments; medium acid; abrupt smooth boundary.

B1—8 to 14 inches; pale olive (5Y 6/3) gravelly silt loam; few fine prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; many fine roots; many fine pores; few dark grayish brown (2.5Y 4/2) fillings in root and worm channels; 20 percent coarse fragments; medium acid; abrupt wavy boundary.

B21—14 to 18 inches; pale olive (5Y 6/3) gravelly loam; common fine prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; common fine roots; many fine pores; few dark grayish brown (2.5Y 4/2) fillings in root and worm channels; 20 percent coarse fragments; medium acid; clear wavy boundary.

B22—18 to 23 inches; light olive gray (5Y 6/2) gravelly loam; common fine prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; many fine pores; few dark grayish brown (2.5Y 4/2) fillings in root and worm channels; 25 percent coarse fragments; medium acid; diffuse wavy boundary.

B23—23 to 30 inches; light olive gray (5Y 6/2) gravelly loam; common fine prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; common fine pores; few dark grayish brown (2.5Y 4/2) fillings in root and worm channels; 30 percent coarse fragments; medium acid; abrupt wavy boundary.

IIC1—30 to 37 inches; olive gray (5Y 5/2) very gravelly loamy sand; massive; friable; few fine roots; 40 percent coarse fragments; medium acid; clear wavy boundary.

IIIC2—37 to 50 inches; olive gray (5Y 5/2) very gravelly sandy loam; many medium distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; many fine pores; 45 percent coarse fragments; medium acid.

The solum ranges from 24 to 40 inches in thickness. Depth to bedrock is more than 5 feet. Rock fragments are mainly gravel with some cobblestones. They range from 10 to 60 percent, by volume, in individual subhorizons of the B horizon and from 25 to 65 percent in the C horizon. Reaction typically increases with depth from strongly acid to slightly acid in the A and B horizons above about 18 inches, to medium acid to neutral below 18 inches in the lower part of the B horizon and in the C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 or 3. Texture of the fine earth is silt loam to sandy loam. Loam is the most common. Structure of the B horizon is very weak or weak subangular blocky.

The C horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 to 3. Texture is gravelly or very gravelly sandy loam to gravelly or very gravelly silt loam, with random strata of coarser textured or finer textured material.

Rhinebeck series

The Rhinebeck series consists of fine, illitic, mesic Aeric Ochraqualfs. These soils are deep, somewhat poorly drained, and nearly level and gently sloping. They are on glacial lake plains and other landforms that are mantled with lake sediment. These soils formed in calcareous lacustrine deposits of clay and silt. They have a fine textured and moderately fine textured subsoil. Slope

ranges from 0 to 8 percent, but is dominantly 0 to 5 percent.

Rhinebeck soils are in a drainage sequence with the moderately well drained Hudson soils and the poorly drained and very poorly drained Madalin soils that formed in similar material. Rhinebeck soils are similar to Odessa and Churchville soils in texture and drainage, but are not so red as Odessa soils and do not have glacial till below a depth of 20 to 40 inches, which Churchville soils have. They have a finer textured solum than Raynham soils that formed in water-laid deposits of coarse silt and very fine sand.

Typical pedon of Rhinebeck silt loam, 0 to 3 percent slopes, in the town of Shawangunk, 0.9 mile north-northeast on Albany Post Road from its intersection with Birch Road and about 0.5 mile west, in cropland:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; strong fine and medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

A2—8 to 10 inches; pale brown (10YR 6/3) silty clay loam; many fine distinct yellowish brown (10YR 5/4) mottles; moderate fine and medium subangular blocky structure; friable; many fine roots; common fine pores; many small oxide concretions; medium acid; clear smooth boundary.

B21tg—10 to 16 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine prominent yellowish brown (10YR 5/4) mottles; moderate; fine and medium subangular blocky structure; firm; many fine roots; common fine pores; thin light brownish gray (2.5Y 6/2) silt and clay films on vertical faces of peds; dark grayish brown (10YR 4/2) fillings in old root and worm channels; many small black oxide concretions; medium acid; abrupt smooth boundary.

B22tg—16 to 28 inches; light brownish gray (2.5Y 6/2) silty clay; many medium prominent yellowish brown (10YR 5/4) mottles; strong coarse prismatic structure parting to moderate coarse subangular blocky; very firm; few fine roots; few fine pores; thin continuous gray (10YR 6/1) clay films on faces of peds; many small black oxide concretions and stains; few small pebbles; neutral; clear smooth boundary.

B23t—28 to 35 inches; dark yellowish brown (10YR 4/4) silty clay; common fine prominent gray (10YR 6/1) mottles; moderate coarse prismatic structure parting to weak coarse subangular blocky; firm; few fine roots; few fine pores; continuous gray (10YR 6/1) clay films on faces of prisms; neutral; clear wavy boundary.

C—35 to 50 inches; dark yellowish brown (10YR 4/4) varved silty clay and silt loam; common fine prominent gray (10YR 6/1) mottles; massive; firm; many small black (10YR 2/1) oxide concretions and stains; slightly calcareous; mildly alkaline.

The solum ranges from 25 to 48 inches in thickness and corresponds with the depth to carbonates. Depth to bedrock is more than 5 feet. Coarse fragments are typically absent, but any horizon can be as much as 5 percent, by volume, coarse fragments.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2. Reaction is medium acid to neutral.

The A2 horizon, if present, has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. It has been mixed by deep plowing in some pedons.

The B horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 4. Texture is silty clay or silty clay loam. Structure is weak to strong, angular or subangular blocky or prismatic. Reaction increases as depth increases and ranges from medium acid to neutral above a depth of about 16 inches and slightly acid or neutral below that.

The C horizon is dominantly varved silt loam to silty clay, but it contains thin strata of very fine sandy loam and fine sandy loam in some pedons. It is mildly alkaline and contains secondary lime carbonates in most profiles.

Riverhead series

The Riverhead series consists of coarse-loamy, mixed, mesic Typic Dystrochrepts. These soils are deep, well drained, and nearly level to very steep. They are on deltas. These soils formed mainly in water-laid deltaic deposits that were dropped as the streams entered glacial lakes. They have a moderately coarse textured subsoil. Slope ranges from 0 to 60 percent, but is dominantly 0 to 8 percent.

Riverhead soils are in a drainage sequence with the moderately well drained Pompton soils, the somewhat poorly drained Walpole soils, and the poorly drained and very poorly drained Lamson soils. Riverhead soils formed in material similar to that in which those soils formed. They have a finer textured solum than Plainfield soils that occupy the same topographic setting. Riverhead soils are similar to Unadilla and Haven soils in drainage but have a coarser textured solum. They also do not have strongly contrasting sand and gravel in the substratum which Haven soils have.

Typical pedon of Riverhead fine sandy loam, 0 to 3 percent slopes, in the town of Rosendale, about 10 feet north of a borrow pit on the northeastern edge of Tillson, in idle area:

Ap—0 to 8 inches; dark brown (10YR 3/3) fine sandy loam; moderate fine and very fine granular structure; very friable; many fine roots; strongly acid; abrupt smooth boundary.

B1—8 to 10 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine and medium granular structure; very friable; many fine roots; many fine pores; strongly acid; abrupt smooth boundary.

B21—10 to 21 inches; strong brown (7.5YR 5/6) sandy loam; weak very fine granular structure; very friable; many fine roots; many fine pores; less than 3 percent fine gravel; strongly acid; clear smooth boundary.

B22—21 to 26 inches; strong brown (7.5YR 5/6) sandy loam; massive; very friable; many fine roots; many fine pores; less than 3 percent fine gravel; strongly acid; clear smooth boundary.

IIC1—26 to 49 inches; dark yellowish brown (10YR 4/4) loamy sand; single grain; loose; common fine roots above 36 inches, few below; less than 3 percent fine gravel; strongly acid; gradual wavy boundary.

IIC2—49 to 62 inches; brown (10YR 4/3) sand; single grain; loose; 5 percent fine gravel; strongly acid.

The solum ranges from 22 to 36 inches in thickness. Depth to bedrock is more than 5 feet. Fine gravel ranges from 2 to 20 percent, by volume, throughout. Some pedons have subhorizons in the A horizon and upper part of the B horizon that are free of coarse fragments. Reaction, in unlimed areas, is very strongly acid or strongly acid throughout.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Texturé is fine sandy loam or loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. Texture of the fine earth is sandy loam or fine sandy loam. Structure is weak granular or subangular blocky, or it is massive. Consistence is friable or very friable.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Texture is sand or loamy sand. Some pedons are gravelly sand or gravelly loamy sand.

Schoharie series

The Schoharie series consists of fine, illitic, mesic Typic Hapludalfs. These soils are deep, moderately well drained to well drained, and gently sloping to steep. They are on dissected lake plains and other glacial landforms that are mantled with lake sediment. These soils formed in reddish calcareous lacustrine deposits of clay and silt. They have a fine textured and moderately fine textured subsoil. Slope ranges from 3 to 35 percent.

Schoharie soils are closely associated with the somewhat poorly drained Odessa soils and, in some areas, with the poorly drained and very poorly drained Madalin soils. They are similar in texture to Hudson and Cayuga soils but do not have glacial till below a depth of 20 to 40 inches, which Cayuga soils have, and are redder than Hudson soils. Schoharie soils have a finer textured subsoil than the more silty Williamson soils that have a fragipan.

Typical pedon of Schoharie silt loam, 8 to 15 percent slopes, in the town of Rochester, about 1 mile north on Clay Hill Road from its intersection with U.S. Route 209 and 85 feet east, in idle area:

Ap—0 to 8 inches; brown (7.5YR 5/2) silt loam; moderate fine and medium granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

A2—8 to 10 inches; reddish brown (5YR 5/4) silty clay loam; strong medium and coarse granular structure; firm; many fine roots; medium acid; abrupt smooth boundary.

B21t—10 to 15 inches; reddish brown (2.5YR 4/4) silty clay; strong medium angular blocky structure; firm; few fine roots; very thin clay films in few fine pores; very thin brown (7.5YR 5/4) silt coatings on faces of peds; medium acid; clear wavy boundary.

B22t—15 to 23 inches; reddish brown (2.5YR 4/4) silty clay; common fine faint reddish brown (5YR 5/3) mottles; moderate coarse subangular blocky structure; very firm; common fine pores; thin continuous reddish brown (5YR 4/3) clay films on faces of peds and in pores; neutral; clear smooth boundary.

B23t—23 to 31 inches; reddish brown (5YR 4/4) silty clay; common fine faint reddish brown (5YR 5/3) and few fine faint reddish brown (5YR 5/4) mottles; moderate coarse subangular blocky structure; very firm; common fine pores; thin continuous reddish brown (5YR 4/3) clay films on faces of peds and in pores; neutral; clear smooth boundary.

B3—31 to 36 inches; reddish brown (2.5YR 4/4) silty clay; many fine faint reddish brown (5YR 4/4) and few fine distinct brown (7.5YR 5/2) mottles; very weak very coarse subangular blocky structure; firm; common fine pores; thin discontinuous reddish brown (5YR 4/3) clay films on faces of peds and in pores; slightly calcareous; mildly alkaline; gradual wavy boundary.

C—36 to 50 inches; reddish brown (2.5YR 4/4) varved silty clay and silty clay loam, dominantly silty clay; many fine faint reddish brown (5YR 4/4) and few fine distinct brown (7.5YR 5/2) mottles; massive; firm; calcareous; mildly alkaline.

The solum ranges from 25 to 40 inches in thickness. Depth to bedrock is more than 5 feet. Coarse fragments are typically absent, but any horizon can have as much as 5 percent, by volume, coarse fragments.

The Ap horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 2 or 3. It is silt loam or silty clay loam. Reaction changes from medium acid to neutral.

The A2 horizon has commonly been mixed in areas where the soil was deeply plowed. Where present, it has hue of 7.5YR to 2.5YR, value of 5 or 6, and chroma of 3 or 4. Texture is silt loam or silty clay loam.

The B2 horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4 and has faint or distinct mottles in most profiles below a depth of 15 to 24 inches. Some subhorizons have hue of 7.5YR. Texture is heavy silty clay loam or silty clay. Structure is moderate or strong, medium or coarse, angular or subangular blocky. Consistence is firm to extremely firm and very

sticky to very plastic. Reaction generally increases as depth increases and is medium acid to mildly alkaline.

The B3 horizon is similar to the B2 horizon in color and texture, but it has a weaker structure.

The C horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 4. Reaction is mildly alkaline or moderately alkaline.

Scio series

The Scio series consists of coarse-silty, mixed, mesic Aquic Dystrochrepts. These soils are deep, moderately well drained, and nearly level. They are predominantly on glacial-stream terraces above the present flood plains, but a few areas are on glacial outwash terraces. These soils formed in gravel-free, water-deposited material high in content of silt and very fine sand. They have a medium textured subsoil. Slope ranges from 0 to 2 percent, but is dominantly 0 to 1 percent.

Scio soils are in a drainage sequence with the well drained Unadilla soils, the somewhat poorly drained Raynham soils, and the poorly drained and very poorly drained Canandaigua soils. They are also associated with Tioga and Hamlin soils and their wetter associates on flood plains. Scio soils are similar in texture and drainage to the Williamson soils but do not have the fragipan that Williamson soils have.

Typical pedon of Scio silt loam, in the town of Ulster, about 0.55 mile west on Esopus Avenue from its intersection with Albany Avenue and 1,800 feet north, in cropland:

Ap—0 to 10 inches; dark brown (10YR 3/3) silt loam, light gray (10YR 7/2) dry; moderate fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

B21—10 to 14 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; many fine roots; many fine and few medium pores; few old root and worm channels filled with brown (10YR 4/3) silt loam; medium acid; clear wavy boundary.

B22—14 to 19 inches; yellowish brown (10YR 5/4) silt loam; common fine faint light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; friable; common fine roots; many fine pores; few old root and worm channels filled with brown (10YR 4/3) silt loam; strongly acid; clear wavy boundary.

B23—19 to 25 inches; brown (7.5YR 5/4) silt loam; common fine faint yellowish brown (10YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate coarse prismatic structure parting to weak coarse subangular blocky; friable; common fine roots; many fine pores; very thin yellowish brown (10YR 5/4) silt coatings on faces of prisms; strongly acid; clear wavy boundary.

B24—25 to 35 inches; strong brown (7.5YR 5/6) silt loam; many medium distinct pinkish gray (7.5YR 6/2) mottles; weak coarse prismatic structure; friable; few fine roots; many fine pores; thin yellowish brown (10YR 5/4) silt coatings on faces of prisms; strongly acid; clear wavy boundary.

C1—35 to 47 inches; brown (7.5YR 5/2) silt loam; many medium distinct strong brown (7.5YR 5/6) mottles; massive; friable; many fine pores; medium acid; gradual wavy boundary.

IIC2—47 to 55 inches; reddish brown (7.5YR 4/3) fine sandy loam; many medium distinct light brownish gray (10YR 6/2) mottles; massive; very friable; 5 percent gravel; neutral.

Depth to bedrock is more than 5 feet. The solum ranges from 22 to 36 inches in thickness. It is typically free of coarse fragments, but individual horizons contain as much as 5 percent gravel, by volume. The C horizon contains 5 to 50 percent coarse fragments. Reaction, in unlimed areas, is very strongly acid to medium acid in the A and B horizons. It increases as depth increases from strongly acid to mildly alkaline in the C horizon.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. Structure is weak or moderate granular.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. Texture is silt loam or very fine sandy loam. Structure is weak or moderate prismatic or subangular blocky.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 or 3. Texture is silt loam to stratified very gravelly sand. Consistence is very friable to firm.

Scriba series

The Scriba series consists of coarse-loamy, mixed, mesic Aeric Fragiaquepts. These soils are deep, somewhat poorly drained, and nearly level and gently sloping. They are on glaciated uplands. These soils formed in glacial till derived mainly from sandstone, quartzite, and conglomerate. They have a dense fragipan at a depth of 12 to 18 inches below the surface that restricts water and root penetrations. These soils have a moderately coarse textured and medium textured subsoil. Slope ranges from 0 to 8 percent.

Scriba soils are in a drainage sequence with the well drained Swartswood soils, the moderately well drained Wurtsboro soils, and the very poorly drained Menlo soils. Scriba soils formed in material similar to that in which these soils formed. They are similar to the somewhat poorly drained Volusia and Morris soils that also formed in glacial till. Scriba soils have a higher content of sand and less silt and clay above the fragipan than Volusia soils. They have more sand in the subsoil and are not so red in the fragipan as Morris soils.

Typical pedon of Scriba gravelly fine sandy loam, in an area of Scriba and Morris very bouldery soils, gently sloping, in the town of Wawarsing, 4 miles west-southwest of Merriman Dam of the Rondout Reservoir, 1.6 miles south on East South Road from its intersection with N.Y. Route 55 and 1,000 feet west, in idle area:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) gravelly fine sandy loam, light brownish gray (10YR 6/2) dry; moderate fine and very fine granular structure; friable; many fine roots; 25 percent coarse fragments; extremely acid; clear smooth boundary.

A2g—9 to 13 inches; grayish brown (2.5Y 5/2) gravelly fine sandy loam; many fine distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; firm; common fine roots; few fine pores; 30 percent coarse fragments; very strongly acid; clear wavy boundary.

Bx1—13 to 19 inches; brown (7.5YR 5/4) gravelly fine sandy loam; many medium distinct brown (10YR 5/3) mottles; moderate very coarse prismatic structure with massive interiors; firm, brittle; few fine roots along faces of prisms; many fine vesicular pores; prisms are separated by gray (5Y 6/1) streaks with light olive brown (2.5Y 5/6) borders; 30 percent coarse fragments medium acid; gradual wavy boundary.

Bx2—19 to 50 inches; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; many medium distinct brown (7.5YR 5/2) mottles; moderate very coarse prismatic structure with massive interiors; very firm, brittle; few fine roots along faces of prisms; thin patchy clay films in many fine vesicular pores; prisms are separated by gray (5Y 6/1) streaks with light olive brown (2.5Y 5/6) borders; 30 percent coarse fragments; slightly acid.

The solum ranges from 36 to 72 inches in thickness. Depth to bedrock is more than 5 feet. Depth to the fragipan ranges from 12 to 18 inches. Rock fragments range from 10 to 30 percent, by volume, in horizons above the fragipan and from 20 to 55 percent in the fragipan and C horizon. Reaction, in unlimed areas, generally increases as depth increases and ranges from extremely acid to slightly acid in the A horizon and from strongly acid to neutral in the B and C horizons.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The fine earth is loam or fine sandy loam.

The A2 horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2. The fine earth is sandy loam, fine sandy loam, or light loam. Structure is weak platy, subangular blocky, or granular. Consistence is friable or firm.

The Bx horizon has hue of 7.5YR to 5Y, value of 4 or 5, and chroma of 2 to 4. The fine earth is sandy loam to light loam. The prisms have massive, platy, or subangular blocky interiors. Consistence is firm or very firm, and brittle.

A C horizon is below the Bx horizon in most pedons. Consistence is firm or very firm. This horizon is massive or platy.

Stockbridge series

The Stockbridge series consists of coarse-loamy, mixed, mesic Dystric Eutrochrepts. These soils are deep, well drained, and gently sloping to hilly. They are on till plains. These soils formed in glacial till derived principally from limestone with a small amount of siltstone, sandstone, and shale. They have a medium textured subsoil. Slope ranges from 3 to 30 percent, but is dominantly 3 to 25 percent.

Stockbridge soils are in a complex pattern with the shallow, well drained and somewhat excessively drained Farmington soils that formed in material similar to that in which Stockbridge soils formed. Stockbridge soils have a higher base status, and do not have the fragipan that the well drained Bath, Swartswood, and Lackawanna soils have. Bath, Swartswood, and Lackawanna soils also formed in glacial till. Stockbridge soils have a higher base status than Valois soils.

Typical pedon of Stockbridge gravelly silt loam, in an area of Stockbridge-Farmington gravelly silt loams, 3 to 8 percent slopes, in the town of Marbletown, about 0.6 mile south on U.S. Route 209 from its intersection with Mar-Cott Center Road and 660 feet east, in idle area:

Ap—0 to 7 inches; dark brown (10YR 4/3) gravelly silt loam; moderate fine granular structure; friable; many fine roots; 15 percent coarse fragments; slightly acid; abrupt smooth boundary.

B21—7 to 14 inches; brown (7.5YR 4/4) gravelly loam; moderate fine subangular blocky structure; friable; many fine roots; many fine pores; 20 percent coarse fragments; slightly acid; clear wavy boundary.

B22—14 to 20 inches; brown (7.5YR 5/4) gravelly loam; moderate fine subangular blocky structure; firm; common fine roots; many fine pores; few clay films in pores; many black oxide stains; 20 percent coarse fragments; slightly acid; clear wavy boundary.

B23—20 to 31 inches; yellowish brown (10YR 5/6) and brown (10YR 4/3) gravelly silt loam; moderate medium subangular blocky structure parting to weak platy; firm; few fine roots; many fine pores; few clay films in pores; 20 percent coarse fragments; slightly acid; gradual wavy boundary.

B3—31 to 34 inches; dark brown (10YR 4/3) gravelly silt loam; weak medium subangular blocky structure; firm; few fine roots; many fine pores; thin clay films in few pores; many oxide stains; 20 percent coarse fragments; slightly acid; gradual wavy boundary.

C—34 to 56 inches; dark brown (10YR 4/3) gravelly silt loam; massive; firm; many fine pores; thin clay films

in few pores; many oxide stains; 20 percent coarse fragments; neutral.

IIR—56 inches; fractured limestone bedrock.

The solum ranges from 24 to 36 inches in thickness. Bedrock is at a depth of more than 40 inches. Rock fragments are mainly gravel with a few cobblestones and stones. They range from 5 to 30 percent, by volume, throughout the subsoil and substratum.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Structure is weak or moderate granular. Reaction, in unlimed areas, is strongly acid to slightly acid.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. The fine earth is silt loam or loam. Structure is weak or moderate subangular blocky. Reaction increases as depth increases and is strongly acid to neutral.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. The fine earth is silt loam or loam. Reaction is neutral to mildly alkaline.

Suncook series

The Suncook series consists of mixed, mesic Typic Udipsamments. These soils are deep, excessively drained, and nearly level. They are on flood plains. These soils formed in sandy recent alluvial deposits. They are coarse textured throughout. Slope ranges from 0 to 3 percent.

Suncook soils are sandier than the associated well drained Barbour and Tioga soils on flood plains. They are similar in texture and drainage to Plainfield soils on deltas and outwash plains, but they have a thinner solum than these soils.

Typical pedon of Suncook loamy fine sand, in the town of Shandaken, about 1.5 miles north on N.Y. Route 28 from its intersection with N.Y. Route 28A and 600 feet west, in wooded area:

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) loamy fine sand; weak medium granular structure; very friable; many fine roots; slightly acid; clear wavy boundary.

C1—3 to 14 inches; dark grayish brown (10YR 4/2) loamy fine sand; massive; very friable; many fine roots; slightly acid; diffuse boundary.

C2—14 to 27 inches; dark grayish brown (10YR 4/2) loamy fine sand; massive; very friable; many fine and few medium roots; slightly acid; abrupt wavy boundary.

C3—27 to 36 inches; dark grayish brown (10YR 4/2) stratified loamy fine sand and fine sand; single grain; loose; many fine roots; slightly acid; abrupt wavy boundary.

C4—36 to 40 inches; dark grayish brown (10YR 4/2) loamy fine sand; massive; very friable; many fine roots; slightly acid; clear wavy boundary.

C5—40 to 53 inches; dark grayish brown (10YR 4/2) loamy fine sand; single grain; loose; many fine roots; slightly acid.

Coarse fragments are generally absent to a depth of 40 inches, but in some pedons coarse fragments range from 0 to 10 percent, by volume, in the upper 20 inches and from 0 to 20 percent between a depth of 20 to 40 inches. Reaction is very strongly acid to slightly acid throughout.

The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2.

The C horizon has hue of 10YR, value of 3 to 6, and chroma of 2 or 3. Texture to a depth of 40 inches is loamy fine sand, loamy sand, or sand. It is dominantly medium and fine sand but ranges to include coarse sand. Many pedons have stratified sand and gravel below a depth of 40 inches.

Swartswood series

The Swartswood series consists of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep, well drained, and gently sloping to very steep. They are on dissected glacial till plains. These soils formed in acid glacial till derived mainly from gray and brown quartzite, conglomerate, and sandstone. A dense fragipan that restricts roots and internal drainage is at a depth of 20 to 36 inches. These soils have a moderately coarse textured and medium textured subsoil. Slope ranges from 3 to 70 percent, but is dominantly 15 to 55 percent.

Swartswood soils are in a drainage sequence with the moderately well drained Wurtsboro soils, the somewhat poorly drained Scriba soils, and the very poorly drained Menlo soils. Swartswood soils formed in material similar to that in which these soils formed. They are similar to Bath and Lackawanna soils that have a higher silt content above the fragipan. In addition, Swartswood soils are not so red as Lackawanna soils.

Typical pedon of Swartswood gravelly fine sandy loam, in an area of Swartswood stony fine sandy loam, 8 to 15 percent slopes, in the town of Shawangunk, 0.5 miles east of Walker Valley, 0.45 mile southeast on N.Y. Route 52 from its intersection with Weed Road and 0.25 mile northeast, in idle area:

Ap—0 to 7 inches; brown (10YR 4/3) gravelly fine sandy loam; moderate very fine granular structure; very friable; many fine roots; 20 percent coarse fragments; very strongly acid; abrupt wavy boundary.

B2—7 to 24 inches; strong brown (7.5YR 5/6) gravelly sandy loam; weak medium subangular blocky structure parting to weak medium and fine granular; friable; common fine roots; many fine pores; 25 per-

cent coarse fragments; very strongly acid; clear wavy boundary.

A'2—24 to 29 inches; yellowish brown (10YR 5/6) gravelly sandy loam; many medium and coarse distinct grayish brown (10YR 5/2) mottles; very weak medium subangular blocky structure; firm brittle; few fine roots; many fine pores; 30 percent coarse fragments; very strongly acid; clear broken boundary.

B'x—29 to 60 inches; olive brown (2.5Y 4/4) gravelly sandy loam; weak very coarse prismatic structure parting to weak thick platy; very firm, brittle; thin clay films in many fine vesicular pores; 35 percent coarse fragments; very strongly acid.

The solum ranges from 40 to 70 inches in thickness. Depth to bedrock is more than 5 feet. Depth to the fragipan ranges from 20 to 36 inches. Rock fragments are angular or subrounded sandstone, conglomerate, or quartzite. They range from 10 to 40 percent, by volume, in individual horizons above the fragipan and from 20 to 60 percent in the Bx and C horizons. Reaction, in unlimed areas, is extremely acid to strongly acid throughout.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The fine earth is fine sandy loam or loam.

A thin A2 horizon is in some undisturbed pedons. It has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 1 to 3.

The B2 horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. The fine earth is fine sandy loam, sandy loam, or loam. Structure is weak or moderate subangular blocky, platy, or granular. Consistence is friable or firm.

The A'2 horizon, if present, is generally thin and not more than 6 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. The fine earth is fine sandy loam, sandy loam, or loam.

The Bx horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6 and has mottles in some pedons. The prisms have platy, subangular blocky, or massive interiors. The fine earth is fine sandy loam, sandy loam, or loam. Consistence is firm or very firm and slightly brittle to very brittle.

Teel series

The Teel series consists of coarse-silty, mixed, mesic Fluvaquentic Eutrochrepts. These soils are deep, moderately well drained to somewhat poorly drained, and nearly level. They are on flood plains. These soils formed in silty alluvium derived from limestone, shale, and fine grained sandstone. They dominantly have a medium textured subsoil. Slope ranges from 0 to 2 percent.

Teel soils are in a drainage sequence with the well drained Hamlin soils and the poorly drained and very poorly drained Wayland soils that formed in material similar to that in which Teel soils formed. They are in positions on flood plains similar to those of the moderately well drained to somewhat poorly drained Middlebury and Basher soils, but have a higher proportion of silt and very fine sand than these soils. In addition, Teel soils have a higher base status than Basher soils and do not have the red colors that these soils have.

Typical pedon of Teel silt loam, in the town of Gardiner, 0.5 mile north-northeast on Bruynswick Road from its intersection with Tillson Lake Road and about 660 feet east, in cropland:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam pale brown (10YR 6/3) dry; moderate fine and medium granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

B21—10 to 16 inches; brown (10YR 4/3) silt loam; moderate medium subangular blocky structure; friable; common fine roots; many fine pores; dark grayish brown (10YR 4/2) fillings in old root and worm channels; medium acid; clear smooth boundary.

B22—16 to 22 inches; dark yellowish brown (10YR 4/4) silt loam; common fine distinct light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; friable; common fine roots; many fine pores; dark grayish brown (10YR 4/2) fillings in old root and worm channels; medium acid; clear smooth boundary.

B23—22 to 28 inches; dark yellowish brown (10YR 4/4) silt loam; many medium distinct light brownish gray (2.5Y 6/2) and common fine faint yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; few fine roots; many fine pores; dark grayish brown (10YR 4/2) fillings in old root and worm channels; slightly acid; gradual wavy boundary.

B3—28 to 38 inches; dark yellowish brown (10YR 4/4) silt loam; common fine faint yellowish brown (10YR 5/4) and many medium and fine distinct light brownish gray (2.5Y 6/2) mottles; weak medium and coarse prismatic structure; friable; few fine roots; many fine and few medium pores; slightly acid; gradual wavy boundary.

C—38 to 50 inches; dark yellowish brown (10YR 4/4) silt loam; common fine faint yellowish brown (10YR 5/4) and many medium and fine distinct light brownish gray (2.5Y 6/2) mottles; massive; friable; many fine and few medium pores; slightly acid.

The solum ranges from 28 to 40 inches in thickness. Depth to bedrock is more than 5 feet. Coarse fragments are absent or few above a depth of 40 inches but increase to as much as 20 percent below 40 inches in some pedons. Reaction, in unlimed areas, is strongly

acid or medium acid in the A horizon, medium acid to neutral in the B horizon, and slightly acid to mildly alkaline in the C horizon.

The Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 2. Structure is weak or moderate, fine or medium granular.

The B horizon has hue of 2.5Y or 10YR, value of 3 or 4, and chroma of 2 to 4. Depth to mottles with chroma of 2 or less ranges from 12 to 24 inches. Texture is very fine sandy loam or silt loam. Structure is weak or moderate, medium or coarse subangular blocky or prismatic. Consistence is friable or very friable.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 4. Texture is fine sandy loam to silt loam. This horizon is massive or has platy structure from fine stratification. Consistence is very friable to firm.

Tioga series

The Tioga series consists of coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts. These soils are deep, well drained, and nearly level. They are on flood plains. These soils formed in alluvium derived from sandstone, siltstone, and shale. They have a medium textured and moderately coarse textured subsoil. Slope ranges from 0 to 3 percent.

Tioga soils are in a drainage sequence with the moderately well drained to somewhat poorly drained Middlebury soils and the poorly drained and very poorly drained Wayland soils. They are also associated with Suncook soils on flood plains and Unadilla soils and their wetter associates on glacial stream terraces. Tioga soils are in positions on flood plains similar to those of the well drained Hamlin and Barbour soils. However, they contain less silt and very fine sand than Hamlin soils and do not have the red colors that Barbour soils have. Tioga soils also have a higher base status than Barbour soils, and they do not have sand and gravel layers within 20 to 40 inches of the surface that Barbour soils have.

Typical pedon of Tioga fine sandy loam, in the town of Hurley, 0.75 mile north of Hurley and 370 feet east of the Esopus Creek, in cropland:

Ap—0 to 10 inches; dark brown (10YR 3/3) fine sandy loam pale brown (10YR 6/3) dry; weak fine and very fine granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

B21—10 to 24 inches; dark brown (10YR 4/3) fine sandy loam; weak thick platy structure parting to weak fine and very fine granular; very friable; common fine roots; common fine pores; neutral; abrupt wavy boundary.

B22—24 to 34 inches; dark yellowish brown (10YR 3/4) very fine sandy loam; very weak coarse prismatic structure parting to weak fine granular; very friable; common fine roots; many fine pores; neutral; abrupt wavy boundary.

IIC1—34 to 40 inches; brown (10YR 5/3) loamy fine sand; massive; very friable; few fine roots; neutral; abrupt wavy boundary.

IIIC2—40 to 53 inches; dark yellowish brown (10YR 4/4) silt loam; common fine distinct brown (10YR 5/3) mottles; massive; very friable; few fine roots; common fine pores; neutral; abrupt wavy boundary.

IIIC3—53 to 65 inches; dark yellowish brown (10YR 4/4) fine sandy loam; many fine distinct grayish brown (10YR 5/2) and common fine faint dark yellowish brown (10YR 3/4) mottles; massive; very friable; few fine pores; slightly acid.

The solum ranges from 18 to 38 inches in thickness. Bedrock is at a depth of more than 5 feet. Strongly contrasting sand and gravel layers are deeper than 40 inches. Coarse fragments are generally absent or few between a depth of 10 and 40 inches. Reaction, in unlimed areas, is strongly acid or medium acid in the A horizon, strongly acid to neutral in the B horizon, and slightly acid or neutral in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 3, and chroma of 2 or 3. Consistence is friable or very friable.

The B horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. It has no mottles above a depth of 24 inches. Texture is mainly silt loam to fine sandy loam; individual subhorizons can be loamy sand. Structure is weak or moderate granular or subangular blocky. Some pedons have weak or very weak platy or prismatic structure. Consistence is friable or very friable.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. Texture is stratified to nonstratified silt loam to very gravelly loamy sand. Consistence is friable or very friable becoming loose as depth increases in some pedons.

Tuller series

The Tuller series consists of loamy-skeletal, mixed, acid, mesic Lithic Haplaquepts. These soils are shallow, somewhat poorly drained to poorly drained, and gently sloping. They are on bedrock-controlled landforms on uplands. These soils formed in a thin glacial till mantle derived mainly from the underlying sandstone, siltstone, and shale bedrock at a depth of 10 to 20 inches. They have a medium textured subsoil. Slope ranges from 3 to 8 percent.

Tuller soils are in a complex pattern with the somewhat poorly drained Morris soils that are deep to bedrock and have a fragipan. They are wet associates of the shallow Arnot soils and the moderately deep Lordstown and Oquaga soils.

Typical pedon of Tuller flaggy silt loam, in an area of Morris-Tuller complex, very bouldery, gently sloping, in the town of Woodstock, about 0.4 mile northwest of the

dam at Kenozia Lake on an unnamed road and 175 feet east, in wooded area:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) flaggy silt loam; strong medium granular structure; friable; many fine and few medium roots; 20 percent coarse fragments; medium acid; abrupt smooth boundary.

B21—7 to 13 inches; light brownish gray (10YR 6/2) flaggy silt loam; many fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; many fine roots; many fine pores; common oxide stains; 30 percent coarse fragments; strongly acid; clear smooth boundary.

B22—13 to 18 inches; brown (10YR 5/3) very flaggy very fine sandy loam; many fine and medium distinct strong brown (7.5YR 5/6) mottles; weak medium platy structure; firm; few fine roots; many fine pores; 40 percent coarse fragments; medium acid; abrupt smooth boundary.

IIR—18 inches; very dark gray (10YR 3/1) horizontally bedded massive sandstone bedrock.

The thickness of the solum ranges from 10 to 20 inches, and coincides with the depth to bedrock. Coarse fragments of angular or subrounded sandstone, siltstone, and shale range from 15 to 55 percent, by volume, in individual horizons throughout the solum but average more than 35 percent below a depth of 10 inches. Reaction, in unlimed areas, is very strongly acid to medium acid.

The Ap horizon has hue of 7.5YR to 2.5Y, value of 3 or 4, and chroma of 2. The fine earth is silt loam or loam. The A1 horizon in an undisturbed area has hue of 10YR, value of 2 to 4, and chroma of 1 or 2.

The B horizon has hue of 5YR to 2.5Y, value of 5 or 6, and chroma of 2 or 3 with distinct or prominent mottles. The fine earth is silt loam, loam, or very fine sandy loam. Structure is moderate prismatic or weak subangular blocky or platy. Consistence is friable or firm.

The underlying bedrock is interbedded sandstone, siltstone, and shale.

Tunkhannock series

The Tunkhannock series consists of loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are deep, well drained to somewhat excessively drained, and nearly level to moderately steep. They are on glacial outwash terraces, kames, and valley trains. These soils formed in glacial outwash derived mainly from acid reddish sandstone, siltstone, and shale. In some areas they have lake-deposited clay and silt in the substratum below a depth of 3-1/2 to 6 feet. These soils are in valleys that have headwaters in the Catskill Mountains. They have a medium textured and moderately coarse textured subsoil. Slope ranges from 0 to 25 percent, but is dominantly 0 to 16 percent.

Tunkhannock soils are in a drainage sequence with the moderately well drained Castile soils, the somewhat poorly drained Red Hook soils, and the poorly drained to very poorly drained Atherton soils. They are redder than Chenango, Hoosic, and Haven soils that also formed in outwash deposits. Tunkhannock soils contain more silt and less sand in the solum than Hoosic soils. They have more coarse fragments in the solum than Haven soils and do not have the contrasting textures that these soils have.

Typical pedon of Tunkhannock gravelly loam, 3 to 8 percent slopes, in the town of Saugerties, 10 feet south of a gravel pit and about 0.3 mile north of the intersection of Cotton and Van Buskirk Roads, in idle area:

Ap—0 to 7 inches; dark reddish brown (5YR 3/3) gravelly loam; moderate fine and very fine granular structure; friable; many fine and few coarse roots; 20 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B21—7 to 13 inches; yellowish red (5YR 4/6) gravelly loam; moderate fine granular structure; friable; many fine roots; common fine pores; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B22—13 to 23 inches; reddish brown (5YR 4/4) gravelly loam; weak fine subangular blocky structure; friable; common fine roots; few fine pores; 30 percent coarse fragments; strongly acid; clear wavy boundary.

B3—23 to 30 inches; reddish brown (5YR 4/4) very gravelly loam; massive; very friable; few fine roots; 45 percent coarse fragments; strongly acid; gradual wavy boundary.

IIC—30 to 80 inches; reddish brown (5YR 4/4) stratified gravel and sand; single grain; loose; 70 percent coarse fragments; strongly acid at 30 inches and medium acid at 72 inches.

The solum ranges from 22 to 35 inches in thickness. Depth to bedrock is more than 5 feet. Rock fragments, mainly gravel with some cobblestones and angular fragments, increase as depth increases in most pedons. They range from 15 to 45 percent, by volume in the A horizon, from 15 to 55 percent in the B horizon, and from 30 to 75 percent in the C horizon. The clayey substratum in some pedons has 0 to 5 percent coarse fragments. Reaction, in unlimed areas, is extremely acid to medium acid throughout, except some pedons have a moderately alkaline clayey substratum.

The Ap horizon has hue of 2.5YR to 10YR, value of 3, and chroma of 2 or 3.

The B horizon has hue of 2.5YR to 7.5YR, value of 4, and chroma of 3 to 6. The fine earth is silt loam and loam to sandy loam.

The C horizon is stratified gravel and sand to very gravelly loamy sand and gravelly sandy loam. Silty clay loam or silty clay is below a depth of 3-1/2 to 6 feet in some pedons.

Unadilla series

The Unadilla series consists of coarse-silty, mixed, mesic Typic Dystrochrepts. These soils are deep, well drained, and nearly level. They are predominantly on glacial stream terraces above the present flood plains, but a few areas are on glacial outwash terraces. These soils formed in gravel-free, water-deposited material high in content of silt and very fine sand. They are taxadjuncts to the Unadilla series in this survey area because they have a higher lime content. These soils have a medium textured subsoil. Slope ranges from 0 to 3 percent, but is dominantly 0 to 2 percent.

Unadilla soils are in a drainage sequence with the moderately well drained Scio soils, the somewhat poorly drained Raynham soils, and the poorly drained and very poorly drained Canandaigua soils. They are also associated with Tioga soils and their wetter associates on flood plains. Unadilla soils are similar in texture and drainage to the Hamlin soils that are on flood plains. They contain more silt and less sand in the solum than Haven soils and do not have the sand and gravel between a depth of 20 and 40 inches that these soils have.

Typical pedon of Unadilla silt loam, in the town of Ulster, about 0.75 mile west on Esopus Avenue from its intersection with Albany Avenue and 1,565 feet north, in cropland:

Ap—0 to 10 inches; dark yellowish brown (10YR 3/4) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

B21—10 to 17 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; friable; many fine roots; common fine pores; dark yellowish brown (10YR 3/4) faces of peds; medium acid; clear wavy boundary.

B22—17 to 40 inches; brown (7.5YR 5/4) silt loam; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; few fine roots; common fine pores; dark yellowish brown (10YR 3/4) faces of peds; medium acid; gradual wavy boundary.

C—40 to 60 inches; dark brown (7.5YR 4/4) silt loam; massive; friable; few fine roots in upper 10 inches; thin silt films in many fine pores; medium acid.

Depth to bedrock is more than 5 feet. The solum ranges from 30 to 45 inches in thickness. It is typically free of coarse fragments, but erratic pebbles and thin layers of gravelly material are within the solum in some pedons. Reaction is medium acid to neutral throughout.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. Structure is weak or moderate granular.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. Texture is silt loam or very fine sandy loam. This horizon has weak or moderate subangular blocky or prismatic structure.

The C horizon has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 2 to 4. Texture is silt loam or very fine sandy loam.

Valois series

The Valois series consists of coarse-loamy, mixed, mesic Typic Dystrochrepts. These soils are deep, very bouldery, well drained, and gently sloping to moderately steep. They are on the lower part of valley walls or on foothills adjacent to glacial outwash deposits. These soils formed in glacial till dominated by material derived from sandstone and siltstone with a small amount of shale. They have a medium textured and moderately coarse textured subsoil. Slope ranges from 3 to 25 percent.

Valois soils are commonly adjacent to Lackawanna, Oquaga, and Lordstown soils on uplands and to Tunkhannock, Chenango, and Hoosic soils on glacial outwash terraces, kames, and valley trains. Valois soils have less coarse fragments between a depth of 10 and 40 inches than Tunkhannock, Hoosic, and Chenango soils that have a well sorted, very gravelly substratum. They are deeper to bedrock than Lordstown and Oquaga soils and contain less coarse fragments than Oquaga soils. Valois soils do not have a fragipan, which Lackawanna soils have.

Typical pedon of Valois gravelly loam, in an area of Valois very bouldery soils, gently sloping, in the town of Olive, 0.5 mile north on Ridge Road from its intersection with N.Y. Route 28 and 25 feet west, in wooded area:

O1—2 inches to 1 inch; litter of leaves and twigs.

O2—1 inch to 0; black (N 2/0) partly decomposed leaves and twigs; extremely acid; abrupt wavy boundary.

A1—0 to 2 inches; dark brown (7.5YR 4/2) gravelly loam; moderate very fine granular structure; very friable; many fine and medium roots; 25 percent coarse fragments; strongly acid; clear wavy boundary.

B21—2 to 11 inches; strong brown (7.5YR 5/6) gravelly silt loam; moderate medium granular structure; very friable; many fine pores; 30 percent coarse fragments; strongly acid; clear wavy boundary.

B22—11 to 29 inches; strong brown (7.5YR 5/6) gravelly loam; weak fine and medium subangular blocky structure; friable; common fine and medium roots; common fine and medium pores; 30 percent coarse fragments; strongly acid; gradual wavy boundary.

B23—29 to 40 inches; brown (7.5YR 5/4) gravelly loam; weak fine and medium subangular blocky structure; friable; common fine roots; common fine and medium pores; 35 percent coarse fragments; strongly acid; gradual wavy boundary.

IIC—40 to 65 inches; dark brown (7.5YR 4/4) very gravelly sandy loam; massive; firm; few fine roots; many fine pores; 50 percent gravel; strongly acid.

The solum ranges from 32 to 65 inches in thickness. Depth to bedrock is more than 5 feet and commonly 10 to 30 feet. Rock fragments range from 15 to 35 percent, by volume, in the A horizon and upper part of the B2 horizon and from 20 to 35 percent in the lower part of the B horizon. Layers that have 35 to 70 percent rock fragments, by volume, are common in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma 2 or 3. The fine earth is loam or silt loam. Reaction, in unlimed areas, is very strongly acid or strongly acid.

The B horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 to 6. The fine earth is fine sandy loam to silt loam. Structure is weak or moderate granular or subangular blocky. Consistence is very friable or friable. Reaction is very strongly acid to medium acid.

The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. The fine earth is fine sandy loam to loam, but pockets or thin layers of loamy sand are in this horizon in a few pedons. This horizon is massive or has platy structure. Consistence is friable or firm. Reaction is strongly acid to neutral.

Volusia series

The Volusia series consists of fine-loamy, mixed, mesic Aeric Fragiaquepts. These soils are deep, somewhat poorly drained, and nearly level to sloping. They are on glacial till plains. These soils formed in glacial till derived mainly from shale, siltstone, and sandstone. A dense fragipan that restricts rooting is at a depth of 15 to 20 inches. These soils have a medium textured subsoil. Slope ranges from 0 to 15 percent, but is dominantly 0 to 8 percent.

Volusia soils are in a drainage sequence with the well drained Bath soils, the moderately well drained Mardin soils, and the poorly drained and very poorly drained Lyons soils. They are similar in drainage to Morris and Scriba soils that formed in glacial till, but have a higher clay content above the fragipan than these soils. Volusia soils are not so red as Morris soils.

Typical pedon of Volusia gravelly silt loam, 3 to 8 percent slopes, in the town of Marlboro, 660 feet north along Lattintown Road from its intersection with Mt. Zion Road and 2,560 feet west, in apple orchard:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) gravelly silt loam; moderate fine and medium granular structure; friable; many fine roots; 20 percent coarse fragments; slightly acid; abrupt smooth boundary.

B2—8 to 15 inches; yellowish brown (10YR 5/4) gravelly silt loam; many medium distinct light brownish gray (2.5Y 6/2) and common fine faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine roots; few fine pores; 20 percent coarse fragments; medium acid; clear smooth boundary.

A'2—15 to 19 inches; light brownish gray (2.5Y 6/2) gravelly silt loam; many medium distinct light olive brown (2.5Y 5/6) mottles; weak medium subangular blocky structure; firm; few fine roots; few fine pores; 20 percent coarse fragments; medium acid; clear broken boundary.

B'x—19 to 58 inches; olive brown (2.5Y 4/4) gravelly silt loam; moderate very coarse prismatic structure parting to weak medium and coarse subangular blocky; very firm, brittle; thin clay films in common fine vesicular pores; prisms are separated by light brownish gray (10YR 6/2) streaks with strong brown (7.5YR 5/8) borders; many dark brown (10YR 3/3) oxide stains; 30 percent coarse fragments; slightly acid; diffuse boundary.

C—58 to 70 inches; olive brown (2.5Y 4/4) gravelly silt loam; massive; firm; many dark brown (10YR 3/3) oxide stains; many fine vesicular pores; 30 percent fragments; neutral.

Depth to bedrock is more than 5 feet. The solum ranges from 40 to 72 inches in thickness. Depth to the top of the fragipan ranges from 15 to 20 inches. Rock fragments, mainly gravel, range from 10 to 30 percent, by volume, above the fragipan and from 20 to 45 percent in the fragipan and C horizon. Reaction, in unlimed areas, generally increases as depth increases. It is very strongly acid or strongly acid in the Ap horizon, very strongly acid to medium acid in the B2 horizon, and strongly acid to mildly alkaline in the fragipan and C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. Structure is weak or moderate, fine or medium granular.

The B2 horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 4. The fine earth is loam or silt loam. Structure is weak or moderate, fine to coarse subangular blocky. Consistence is friable or firm.

The A'2 horizon is absent in some profiles. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2. The fine earth is loam or silt loam. Structure is weak platy or subangular blocky. Consistence is friable or firm.

The Bx horizon has hue of 10YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4 and has few to many mottles in some pedons. The fine earth is loam or silt loam. Consistence is very firm or firm, and brittle.

The C horizon has hue of 10YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. It has platy structure or is massive.

Walpole series

The Walpole series consists of sandy, mixed, mesic Aeric Haplaquepts. These soils are deep, somewhat poorly drained, and nearly level. They are on deltas and outwash terraces. These soils formed in water-sorted sandy sediment. They dominantly have a moderately coarse textured subsoil. Slope ranges from 0 to 2 percent, but is dominantly 0 to 1 percent.

Walpole soils are in a drainage sequence with the well drained Riverhead soils, the moderately well drained Pompton soils, and the poorly drained and very poorly drained Lamson soils. Walpole soils formed in material similar to that in which those soils formed. They are similar to Raynham and Red Hook soils in drainage but are coarser textured than these soils. In addition, Walpole soils do not have the gravel that Red Hook soils have.

Typical pedon of Walpole fine sandy loam, in Saugerties, about 0.75 mile south on Washington Avenue from its intersection with Mike Draut Road and about 660 feet west, in meadow:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; many fine roots; medium acid; clear smooth boundary.

B21—10 to 17 inches; brown (10YR 5/3) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; common fine roots; many fine pores; medium acid; clear irregular boundary.

B22g—17 to 23 inches; dark grayish brown (10YR 4/2) sandy loam; common fine distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; very friable; few fine roots; many fine pores; medium acid; clear wavy boundary.

B3g—23 to 27 inches; dark grayish brown (10YR 4/2) fine sandy loam; few fine faint dark yellowish brown (10YR 4/4) root stain mottles; massive; very friable; common fine pores; medium acid; clear wavy boundary.

Cg—27 to 60 inches; gray (10YR 5/1) loamy sand; few fine distinct dark yellowish brown (10YR 4/4) root stain mottles; single grain; loose; mediun acid.

The solum ranges from 20 to 28 inches in thickness. Depth to bedrock is more than 5 feet. Coarse fragments are typically absent or few, but range from 0 to 20 percent, by volume, in the C horizon. Reaction, in unlimed areas, is very strongly acid to medium acid throughout.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2. A thin A2 horizon is below the A1 horizon in some undisturbed areas.

The B2 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3 and has distinct or prominent mottles. Texture is fine sandy loam or sandy loam and thin individual subhorizons of loam. Structure is weak or very weak granular, or subangular blocky. Some subhorizons are massive. Consistence is very friable or friable.

The B3 horizon has colors similar to the B2 horizon. Texture is fine sandy loam to sandy loam with occasional lenses of loamy fine sand. This horizon is massive or has weak or very weak granular or subangular blocky structure. Consistence is friable to loose.

The C horizon has hue of 10YR or 2.5Y, value of 5, and chroma of 1 to 4. Mottles have higher chroma. Texture is loamy sand to gravelly sand. Thin strata of fine sandy loam are in some pedons.

Wayland series

The Wayland series consists of fine-silty, mixed, nonacid, mesic Mollic Fluvaquents. These soils are deep, poorly drained and very poorly drained, and nearly level. They are in old oxbow areas of former stream channels and in the lower depressions on flood plains. These soils formed in alluvium. They have a medium textured and moderately fine textured subsoil. Slope is mainly less than 1 percent.

Wayland soils commonly are in a drainage sequence with the moderately well drained to somewhat poorly drained Teel and Middlebury soils and the well drained Hamlin and Tioga soils. Teel and Hamlin soils formed in material similar to that in which Wayland soils formed. Wayland soils are similar to Canandaigua soils in texture and drainage but have a weaker developed subsoil than these soils.

Typical pedon of Wayland mucky silt loam, in the town of New Paltz, 1.75 miles southwest of the Village of New Paltz and about 75 feet west of Libertyville Road, in wooded area:

A1—0 to 5 inches; black (10YR 2/1) mucky silt loam, very dark grayish brown (10YR 3/2) rubbed; few fine distinct dark yellowish brown (10YR 4/4) mottles; strong fine granular structure; friable; many fine roots; medium acid; clear smooth boundary.

A3g—5 to 12 inches; dark gray (N 4/0) silt loam; many fine and medium distinct dark brown (10YR 3/3) mottles; moderate medium granular structure; slightly sticky; common fine roots; few fine pores; strongly acid; abrupt smooth boundary.

B2g—12 to 24 inches; olive gray (5Y 5/2) light silty clay loam; many fine and medium distinct yellowish brown (10YR 5/4) mottles; weak very coarse prismatic structure parting to weak medium subangular

blocky; slightly sticky, plastic; few fine roots; few fine pores; strongly acid; clear wavy boundary.

Cg—24 to 50 inches; gray (5Y 5/1) silt loam; many medium and fine prominent yellowish brown (10YR 5/4) mottles, few below 40 inches; massive; slightly sticky; few fine pores; medium acid in the upper 6 inches, slightly acid at 40 inches.

The solum ranges from 20 to 32 inches in thickness. Depth to bedrock is more than 5 feet. Depth to contrasting gravelly and sandy material is more than 40 inches. Coarse fragments are absent or few. Reaction generally increases as depth increases and is strongly acid to neutral in the surface layer, strongly acid to mildly alkaline in the subsoil, and medium acid to mildly alkaline in the substratum.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 0 to 2. Texture is silt loam or mucky silt loam.

The A3 horizon is thin or absent in some pedons. It has value of 3 or more.

The B horizon has hue of 5Y to 7.5YR, value of 4 to 6, and chroma of 1 or 2 and has distinct or prominent mottles of higher chroma. Texture is silt loam or silty clay loam. Structure is weak or moderate subangular blocky, or weak prismatic.

The C horizon is similar to the B horizon in color. Texture is silt loam to fine sandy loam.

Wellsboro series

The Wellsboro series consists of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep, moderately well drained, and gently sloping and sloping. They are on glaciated uplands. These soils formed in glacial till derived mainly from reddish sandstone, siltstone, and shale. A dense fragipan is at a depth of 15 to 25 inches and restricts water and root penetration. These soils have a medium textured and moderately coarse textured subsoil. Slope ranges from 3 to 15 percent.

Wellsboro soils are in a drainage sequence with the well drained Lackawanna soils and the somewhat poorly drained Morris soils. They are also near the very poorly drained Menlo soils in a few areas. Wellsboro soils are similar to Mardin and Wurtsboro soils but have a redder subsoil than these soils. In addition, they have a higher silt content above the fragipan than Wurtsboro soils.

Typical pedon of Wellsboro flaggy silt loam, in an area of Wellsboro and Wurtsboro very bouldery soils, gently sloping, in the town of Woodstock, about 1.7 miles east on Piney Point Road from its intersection with N.Y. Route 28 and 950 feet north, in meadow:

Ap—0 to 9 inches; dark brown (10YR 4/3) flaggy silt loam; moderate fine granular structure; very friable; many fine roots; 20 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—9 to 16 inches; yellowish red (5YR 4/6) flaggy silt loam; moderate fine and medium subangular blocky structure; friable; common fine roots; common fine pores; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B22—16 to 21 inches; brown (7.5YR 5/4) gravelly loam; many medium distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; firm; few fine roots; few fine pores; 25 percent coarse fragments; strongly acid; clear wavy boundary.

Bx—21 to 50 inches; reddish brown (5YR 4/4) gravelly loam; many coarse faint brown (7.5YR 4/4) and few fine distinct pinkish gray (7.5YR 6/2) mottles; weak very coarse prismatic structure parting to weak thick platy; firm, brittle; thin clay films in common fine vesicular pores; prisms are separated by pinkish gray (7.5YR 6/2) streaks with strong brown (7.5YR 5/6) borders; common oxide stains; 30 percent coarse fragments; strongly acid.

The solum ranges from 40 to 75 inches in thickness. Depth to the fragipan ranges from 15 to 25 inches but is commonly 18 inches. Depth to bedrock is more than 5 feet. Rock fragments of angular or subrounded sandstone, siltstone, and shale range from 15 to 35 percent, by volume, in individual horizons above the fragipan and from 15 to 50 percent in the fragipan and C horizon. Reaction, in unlimed areas, is very strongly acid to medium acid throughout.

The Ap horizon has hue of 5YR to 10YR, value of 3 or 4, and chroma of 3. Undisturbed pedons have an A1 horizon above a thin A2 horizon. The A2 horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2.

The B2 horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 3 to 6 and has mottles below a depth of 12 inches. The fine earth is silt loam or loam. Structure is weak or moderate granular or subangular blocky.

A thin A'2 horizon is present above the fragipan in some pedons.

The Bx horizon has hue of 10R to 5YR, value of 3 to 5, and chroma of 3 or 4. It has mottles in prism interiors. In most pedons, the prisms are separated by streaks that have a brighter colored border. The fine earth is silt loam to sandy loam. Prism interiors are platy, subangular blocky, or massive.

The C horizon is similar to the Bx horizon in color and texture.

Williamson series

The Williamson series consists of coarse-silty, mixed, mesic Typic Fragiochrepts. These soils are deep, moderately well drained, and nearly level and gently sloping. They are on lake plains and uplands. These soils formed in wind or water- deposited silt, very fine sand, and some clay. A fragipan that restricts water and root penetration

is at a depth of 15 to 24 inches. These soils have a medium textured subsoil. Slope ranges from 0 to 8 percent, but is dominantly 2 to 8 percent.

Williamson soils are closely associated with the somewhat poorly drained Raynham soils and the poorly drained and very poorly drained Canandaigua soils that formed in material similar to that in which Williamson soils formed. They are similar in drainage to Scio and Pompton soils that do not have a fragipan. In addition, Williamson soils have a finer textured solum than Pompton soils.

Typical pedon of Williamson silt loam, 0 to 3 percent slopes, in the town of Esopus, about 0.38 mile east of Union Center Road from its intersection with Hellbrook Lane and 1,402 feet south, in apple orchard:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine and medium granular structure; friable; many fine roots; common fine pores; many dark brown (7.5YR 4/4) root stains; strongly acid; abrupt smooth boundary.

B21—8 to 14 inches; strong brown (7.5YR 5/6) silt loam; weak fine and medium subangular blocky structure; friable; common fine roots; common fine pores; medium acid; clear smooth boundary.

B22—14 to 18 inches; strong brown (7.5YR 5/6) silt loam; common fine distinct pale brown (10YR 6/3) and common fine faint yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; friable; few fine roots; many fine pores; medium acid; clear smooth boundary.

Bx1—18 to 26 inches; brown (7.5YR 5/4) silt loam; common medium distinct pale brown (10YR 6/3) and yellowish brown (10YR 5/6) mottles; weak very coarse prismatic structure; firm and brittle; few fine roots along faces of peds; clay linings in many vesicular pores; thin pale brown (10YR 5/3) discontinuous silt coatings on faces of peds; medium acid; clear smooth boundary.

Bx2—26 to 42 inches; brown (10YR 4/4) very fine sandy loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; firm; few fine roots along faces of peds; clay linings in many fine vesicular pores; thin light brownish gray (10YR 6/2) discontinuous silt coatings on faces of peds; medium acid; gradual wavy boundary.

C—42 to 52 inches; layered yellowish brown (10YR 5/4) silt loam and reddish brown (5YR 4/4) silty clay loam, dominantly silt loam; common fine distinct light brownish gray (2.5Y 6/2) mottles; massive; friable and firm; clay linings in common fine pores; neutral.

The solum ranges from 40 to 55 inches in thickness. Depth to bedrock is more than 5 feet. Depth to the fragipan ranges from 15 to 24 inches. Coarse fragments are absent or very few.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. Reaction, in unlimed areas, is very strongly acid to medium acid.

The B2 horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. Texture is silt loam or very fine sandy loam. This horizon has fine or medium granular or subangular blocky structure. Reaction is very strongly acid to slightly acid.

An A'2 horizon is present in some pedons. It has hue of 2.5Y to 5YR, value of 5 to 7, and chroma of 3 or 4 and has common or many distinct or prominent mottles.

The Bx horizon has hue of 2.5Y to 5YR, value of 4 or 5, and chroma of 3 or 4. Structure is very coarse prismatic or weak thick platy. Reaction is strongly acid or medium acid.

The C horizon is stratified silt loam, very fine sandy loam, or silty clay loam. Reaction is strongly acid to neutral.

Wurtsboro series

The Wurtsboro series consists of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep, moderately well drained, and gently sloping. They are on glaciated uplands. These soils formed in glacial till derived mainly from gray and brown sandstone, quartzite, and conglomerate. A dense fragipan is at a depth of 17 to 28 inches and restricts water and root penetration. These soils have a moderately coarse textured and medium textured subsoil. Slope ranges from 3 to 8 percent.

Wurtsboro soils are in a drainage sequence with the well drained Swartswood soils, the somewhat poorly drained Scriba soils, and the very poorly drained Menlo soils. Wurtsboro soils formed in material similar to that in which those soils formed. They are similar to Mardin and Wellsboro soils that have a higher content of silt above the fragipan. In addition, Wurtsboro soils are not so red as Wellsboro soils.

Typical pedon of Wurtsboro gravelly loam, in an area of Wurtsboro stony loam, 3 to 8 percent slopes, in the town of Wawarsing, 0.75 mile northeast of the Church at Ulster Heights and 175 feet east of a swimming pool, in meadow:

Ap—0 to 6 inches; brown (10YR 4/3) gravelly loam; moderate fine and medium granular structure; friable; many fine roots; 20 percent coarse fragments; strongly acid; abrupt smooth boundary.

B2—6 to 12 inches; yellowish brown (10YR 5/6) gravelly sandy loam; weak medium subangular blocky structure parting to weak fine granular; friable; common fine roots; few fine pores; 20 percent coarse fragments; medium acid; clear wavy boundary.

A'2—12 to 19 inches; brown (10YR 5/3) gravelly sandy loam; many medium and coarse distinct yellowish brown (10YR 5/6) mottles; weak very thick platy structure parting to weak fine subangular blocky;

friable; few fine roots; common fine pores; 20 percent coarse fragments; medium acid; clear wavy boundary.

B'x1—19 to 36 inches; dark yellowish brown (10YR 4/4) gravelly fine sandy loam with pockets of gravelly loam; many medium and coarse faint brown (10YR 5/3) mottles; moderate very coarse prismatic structure parting to thick platy; very firm, brittle; very few fine roots along faces of prisms; thin clay films in many fine vesicular pores; prisms are separated by light brownish gray (2.5Y 6/2) streaks with brown (10YR 4/3) borders; 25 percent coarse fragments; medium acid; diffuse wavy boundary.

B'x2—36 to 56 inches; dark brown (7.5YR 4/4) gravelly loam; massive; very firm, brittle; thin continuous clay films in many fine vesicular pores; 25 percent coarse fragments; medium acid.

The solum ranges from 40 to 70 inches in thickness. Depth to bedrock is more than 5 feet. Depth to fragipan ranges from 17 to 28 inches. Rock fragments are angular or subrounded sandstone, conglomerate, or quartzite. They range from 10 to 35 percent, by volume, in individual horizons above the fragipan and from 15 to 60 percent in the Bx and C horizons. Reaction, in unlimed areas, is very strongly acid to medium acid.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3. A thin A2 horizon is present in some undisturbed pedons.

The B2 horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6 and has mottles in the lower part of some pedons. The fine earth is fine sandy loam, sandy loam, or loam. Structure is weak or moderate granular or blocky.

The A'2 horizon is absent in some pedons. It has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The fine earth is fine sandy loam, sandy loam, or loam.

The B'x horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 6. The fine earth is fine sandy loam, sandy loam, or loam. It has weak or moderate, very coarse prismatic structure with platy, subangular blocky, or massive interiors. Consistence is firm or very firm and slightly brittle to very brittle.

Formation and classification of the soils

The first part of this section discusses the factors of soil formation, relates them to the formation of soils in the survey area, and explains the processes of soil formation. The second part defines the categories in the system of soil classification and shows where the soils in Ulster County are placed in the system.

Factors of soil formation

Soils formed through the interaction of five major factors. They are parent material, climate, plant and animal life, relief, and time. The relative influence of each factor generally varies from place to place. Local variations in soils are largely due to differences in kind of parent material, relief, and drainage. Although these factors are interrelated, in places one factor can be dominant in the formation of a soil and determine most of the properties of that soil.

Parent material

Parent material is the unconsolidated mass in which soils formed or are forming. It determines the mineralogical composition and contributes largely to the chemical composition of the soil. It also greatly influences the soil colors and rate at which soil-forming processes take place.

In Ulster County, soils formed in glacial till, glaciofluvial deposits (outwash), glaciolacustrine sediment, recent stream alluvium, and organic materials. Table 18 shows the relationship between soil series and their position, parent material, and drainage. Most of the soil materials were left after the glaciers melted about 14,000 years ago. Alluvial and organic materials are of recent origin and currently are being deposited.

Soils that formed in glacial till are the most extensive and have a wide range in characteristics. Much mixing of these soil-forming materials has taken place as a result of glaciation. Most of the till deposits have as a dominant component the fragments and soil material of the bedrock that underlies the till mass (fig. 12). Firm substrata and a fragipan in the subsoil are common in the deeper soils. Bath, Mardin, and Volusia soils formed in deep glacial till.

Soils that formed in glaciofluvial outwash deposits and other water-sorted sediments are generally loamy or sandy. They commonly are underlain by stratified sand and gravel or by sand with some gravel. Chenango, Hoosic, and Tunkhannock soils are examples of those soils underlain by stratified sand and gravel. Plainfield and Riverhead soils are dominantly underlain by sand.

Soils that formed in glaciolacustrine sediment have a medium textured or moderately fine textured and fine textured subsoil. Hudson and Schoharie soils are examples of soils that have a moderately fine textured and fine textured subsoil. Unadilla, Williamson, Scio, Raynham, and Canandaigua soils have a medium textured subsoil.

Soils on flood plains formed in water-laid materials called recent alluvium. They are medium textured, moderately coarse textured, or coarse textured and show little profile development. Examples are Tioga and Middlebury soils.

Soils that formed in organic materials are Carlisle, Palms, and Palms, bedrock variant, soils.

Though most of the soils in the county formed in just one type of glacial deposit, two soils formed in contrasting layers of lakebed (lacustrine) sediment and till. These are the Cayuga and Churchville soils that formed in lacustrine silt and clay underlain by glacial till at a depth of 20 to 40 inches.

Climate

Climate, particularly temperature, precipitation, and frost action, is one of the most influential of the soil-forming factors. It largely determines the kind of weathering process that occurs. It also affects the growth and kind of vegetation and the rate of leaching and translocation of weathered materials.

Ulster County has a humid, continental type of climate, marked by extreme seasonal changes in temperature. The climate varies enough between the Hudson River Valley and the Catskill Mountains to cause some minor differences in soils. Moisture is sufficient to promote leaching of the soil and downward movement of carbonates. The cool temperature and prolonged wetness in many areas have caused accumulation of organic matter in the surface layer of the soils. More detailed information on climate is in the section "General nature of the county."

Plant and animal Life

All living organisms are important to soil formation. These include vegetation, animals, bacteria, and fungi. Ulster County was originally in a native forest of hardwoods and conifers in varying proportions. The loss of bases (nutrients) through leaching is retarded by hardwoods that take up the nutrients and return them to the surface each year as leaf litter. Conifers do not use large amounts of nutrients; and, therefore, leaching is not retarded as it is under hardwoods. Vegetation generally is also responsible for the amount of organic matter in the surface layer and for the color and structure of the surface layer.

Earthworms and larger burrowing animals make the soil more permeable to air and water. Their waste products cause aggregations of the soil particles and improve soil structure. The formation of organic acid by the action of bacteria and fungi on leaf litter helps in weathering soil minerals to available forms. Soil microbial life decomposes the organic waste products returned to the soil.

The activities of man have brought about significant changes in many soils of the county. Clearing and tillage have accelerated erosion on most slopes. Artificial drainage has altered the environment of wet soils. In cultivated fields, the organic matter content of the surface layer has been altered, and in many places the subsoil has been mixed with the surface layer through plowing. The microbiology of the soil is often changed by continued use of lime, fertilizer, and pesticides.

Relief

The shape of the land surface, the slope, and the position of the land surface to the underlying water table have had a great influence on the formation of the soils in the county. Through runoff, high-lying soils that have convex slopes lose some of the rain that falls, generally to soils in adjacent lower areas. This loss can cause a difference in the amount of water that is absorbed by the soils in different parts of the landscape. Soils formed in sloping areas where runoff is moderate to rapid generally are well drained and have a bright colored, unmottled subsoil. In more gently sloping areas where runoff is slower, the soils generally exhibit some evidence of wetness for short periods of time, for example, mottling in the subsoil. In level areas or slight depressions that accumulate much runoff or where the water table is at or near the surface for long periods, the soils show marked evidence of wetness. Naturally wet soils, such as Madalin and Lyons soils, have a dark colored surface layer and a very strongly mottled or grayish subsoil. Organic soils, such as Carlisle and Palms soils, are also naturally wet soils. The permeability of the soil, as well as the length, gradient, and configuration of the slope, influence the kind of soil that forms from place to place. Local differences in the soils of Ulster County are largely the result of differences in parent material and relief.

Time

The time required for a soil to form depends on the other soil-forming factors. This is generally a long time. Less time is required for a soil to form in a warm, moist climate than in a cool, dry climate. Some parent material is more resistant to the soil-forming processes than others. For example, quartz sand may change very little even if it is exposed for centuries. The relative degrees of horizon development rather than the number of years a soil has been in the process of forming determine the age of the soil. The soils in Ulster County formed since the last glacier retreated from the area about 10,000 years ago.

When soils begin to form in loose material, they have characteristics almost identical to those of the parent material. Such soils are said to be immature or youthful. Among the immature soils in Ulster County are Hamlin and Teel soils. These soils are on flood plains where alluvial sediment accumulates. They have indistinct horizons, weak color differences between horizons, and little other evidence of horizon development. A soil is generally said to reach a degree of maturity when it has acquired well developed profile characteristics. Examples of relatively mature soils in Ulster County are the Bath and Hoosic soils that have been forming since glaciation.

These soils are deep to bedrock and have distinct horizons.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*11*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 19, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Inceptisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquept (*Aqu*, meaning water, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Haplaquepts (*Hapl*, meaning simple horizons, plus *aquept*, the suborder of Inceptisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Aeric* identifies the subgroup that is thought to be better aerated than typical for the great group. An example is Aeric Haplaquepts.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is coarse-loamy, mixed, nonacid, mesic, Aeric Haplaquepts.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition. Lamson is an example of a series name.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	More than 5.2

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock control. Configuration and relief of a landform is determined or strongly influenced by the underlying bedrock, for example, a 'bedrock controlled till plain.'

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Channery soil. A soil, that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light textured) soil. Sand or loamy sand.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake. The rapid movement of water into the soil.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action. Freezing and thawing of soil moisture. Frost action can damage structures and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by melt water as it flows from glacial ice.

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes by water originating mainly from the melting of glacial ice. Many are interbedded or laminated.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the

overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material mixed with mineral soil material. The content of organic matter is more than 20 percent.

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Narrow-base terrace. A terrace no more than 4 to 8 feet wide at the base. A narrow-base terrace is similar to a broad-base terrace, except for the width of the ridge and channel.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by water that originated mainly from the melting of glacial ice. Glacial outwash is commonly in valleys on landforms known as valley trains, outwash terraces, eskers, kame terraces, kames, outwash fans, or deltas.

Outwash plain. A land form of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of subsurface tunnels or pipelike cavities in the soil.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction be-

cause it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.005 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from

the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil, or partly worked into the soil, to provide protection from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use or management.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or " very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

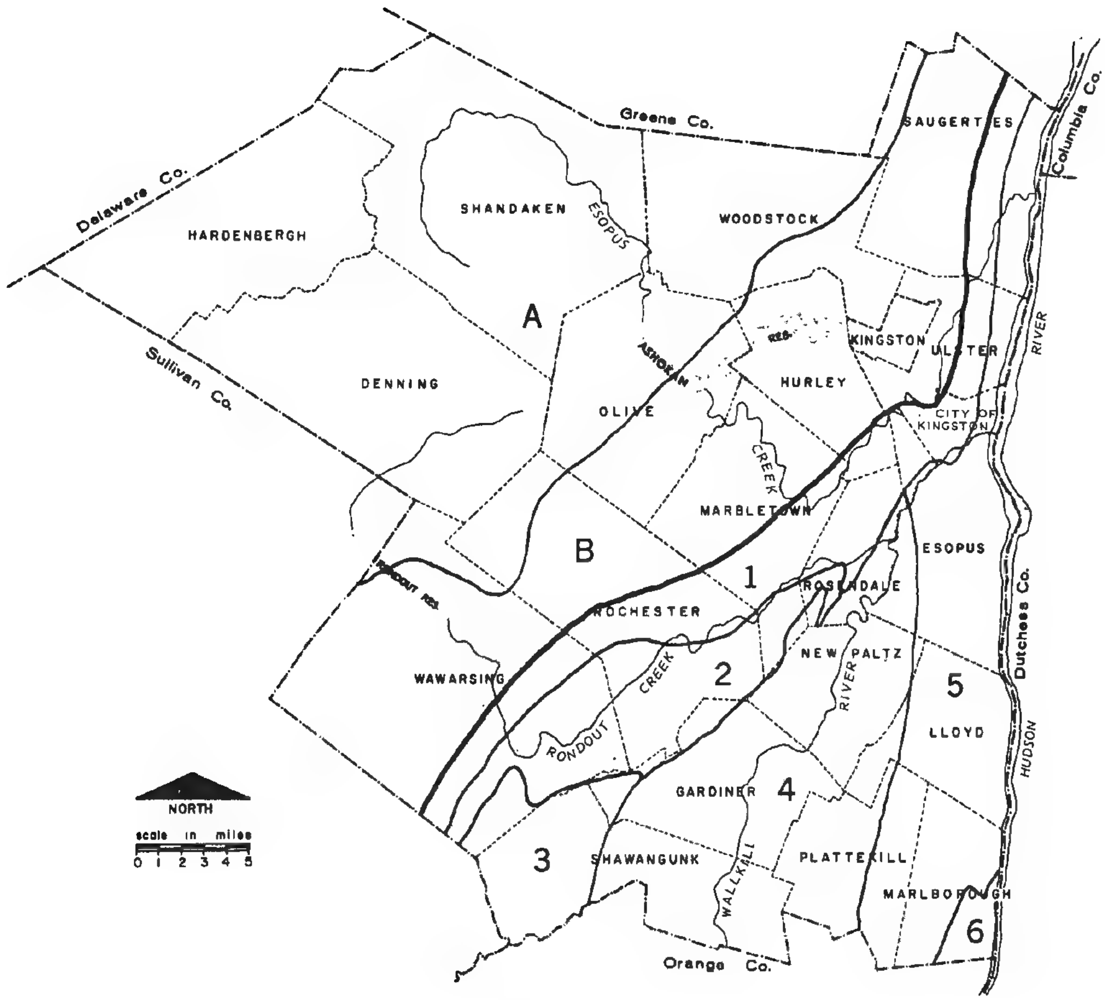
Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

ILLUSTRATIONS



LEGEND

Appalachian Plateaus Province-Catskill Mountain area

A Catskill Mountains region - near horizontal bedded Devonian sandstones, siltstones and shales

B "Plateau" region - near horizontal bedded Devonian sandstones, siltstones and shales

Valley and Ridge Province - Hudson Lowland area

1 Rondout-Esopus Valley region - once folded and faulted Devonian and Silurian limestones, shales and sandstones

2 Shawangunk Mountain region - once folded and faulted Silurian quartz pebble conglomerate and sandstone

3 Unnamed region - twice folded and faulted Ordovician sandstones, shales and siltstones

4 Wallkill Valley region - twice folded Ordovician shales and siltstones

5 Marlboro Mountain region - twice folded and faulted Ordovician sandstones, siltstones and shales

6 Unnamed region - twice folded and faulted Ordovician shales and siltstones, and Cambro-Ordovician limestones

Figure 1.—Physiography, bedrock geology, and major drainage systems of Ulster County.

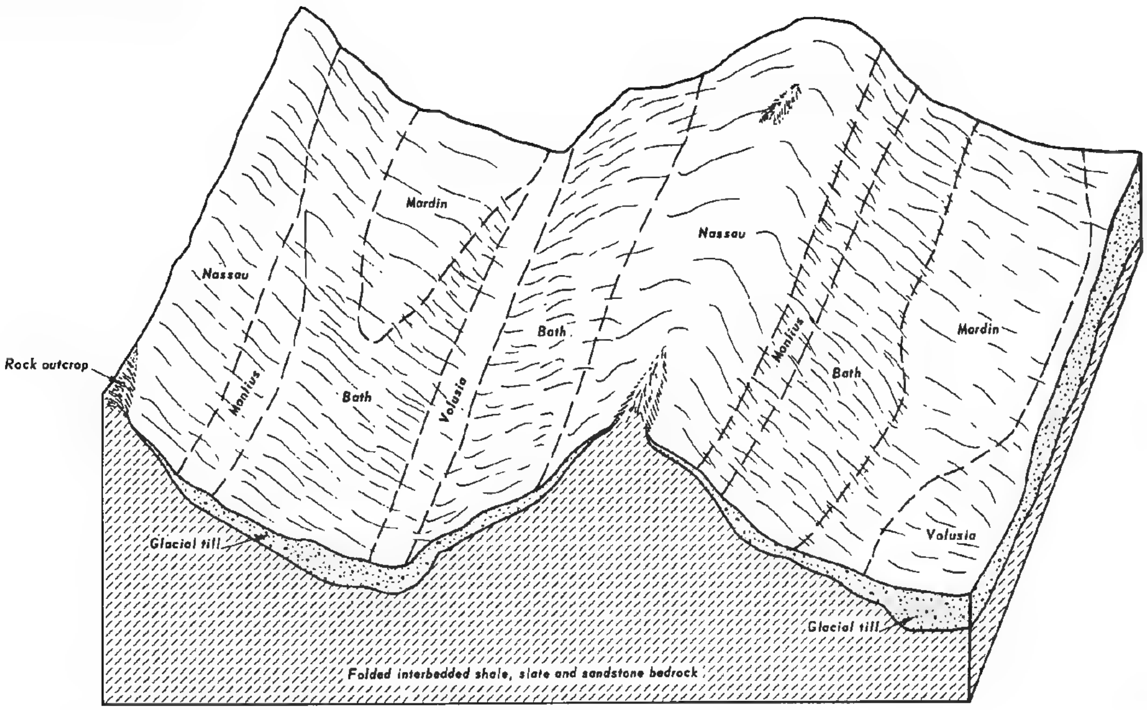


Figure 2.—Typical relationship of soils and underlying material in Bath-Nassau map unit.

Figure 3.—Undercutting of streambanks in Barbour loam is a hazard and produces a large volume of sediment.

Figure 4.—An abandoned asphalt road on Carlisle muck. This soil has low strength. Adequate precautions should be taken in road construction.

Figure 5.—An area of Hoosic cobbly loam, 0 to 3 percent slopes, showing cobblestones that make cultivation difficult.

Figure 6.—An area of extremely bouldery Lackawanna and Swartswood soils. These soils are suited to woodland and wildlife habitat.

Figure 7.—Corn on Riverhead fine sandy loam, 0 to 3 percent slopes. This soil is well suited to the production of corn.

Figure 8.—Floodwater damage on Tioga fine sandy loam.

Figure 9.—A dwelling constructed on a Farmington soil. Where bedrock is shallow, a large amount of fill is required to cover utility lines.

Figure 10.—Dwellings constructed on Tioga soils are subject to occasional flooding.

Figure 11.—Nassau soils have tilted bedrock at a shallow depth.

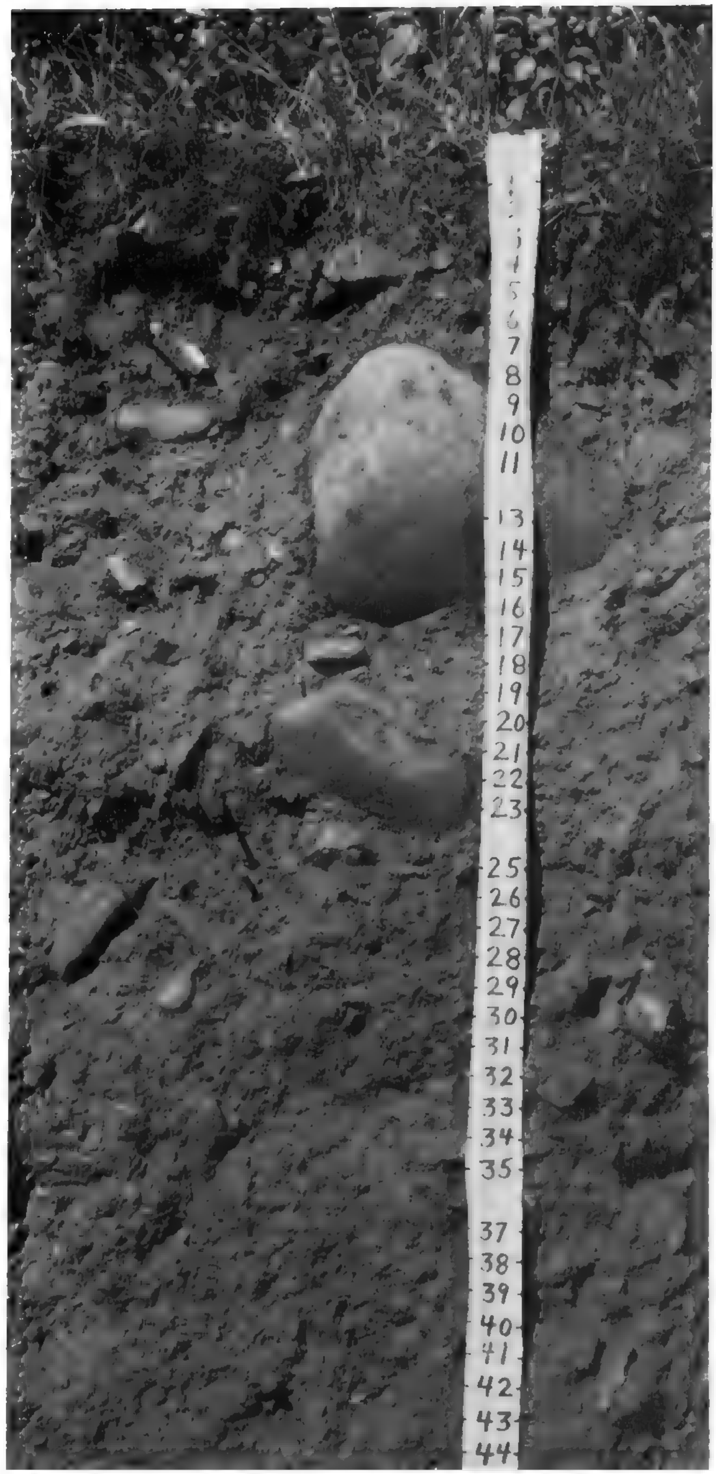


Figure 12.—Rock fragments are common in soils formed in glacial till.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

Month	Temperature[1]						Precipitation[1]				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[2]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	31.6	17.3	24.4	55	-7	6	3.11	1.74	4.22	7	14.3
February---	34.1	18.3	26.2	54	-7	0	3.40	2.24	4.45	6	16.0
March------	42.1	26.0	34.1	66	6	24	3.79	2.57	4.90	8	14.5
April------	56.6	37.1	46.9	81	20	229	4.39	2.81	5.82	8	4.5
May--------	67.1	47.8	57.5	86	31	543	3.95	1.98	5.56	8	.1
June-------	74.6	57.6	66.1	89	44	783	3.76	2.02	5.17	7	.0
July-------	78.8	62.7	70.7	91	50	952	4.18	1.80	6.11	7	.0
August-----	77.0	61.1	69.1	89	48	902	4.12	1.87	5.94	7	.0
September--	70.0	54.2	62.1	87	37	663	4.00	2.12	5.53	6	.0
October----	60.3	44.6	52.5	79	26	388	3.85	1.52	5.73	5	.4
November---	47.2	33.7	40.4	68	12	100	4.19	2.75	5.50	8	4.3
December---	34.8	22.2	28.5	59	-2	17	4.24	2.50	5.79	8	13.9
Year-----	56.2	40.2	48.2	93	-10	4,607	46.98	39.52	54.11	85	68.0

[1]Recorded in the period 1951-75 at Mohonk Lake, N.Y.

[2]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40°F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature[1]		
	24°F or lower	28°F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 15	April 29	May 11
2 years in 10 later than--	April 11	April 24	May 5
5 years in 10 later than--	April 3	April 13	April 24
First freezing temperature in fall:			
1 year in 10 earlier than--	October 28	October 16	October 6
2 years in 10 earlier than--	November 2	October 21	October 11
5 years in 10 earlier than--	November 13	October 31	October 21

[1]Recorded in the period 1951-75 at Mohonk Lake, N.Y.

TABLE 3.--GROWING SEASON LENGTH

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24°F	Higher than 28°F	Higher than 32°F
	Days	Days	Days
9 years in 10	204	179	155
8 years in 10	211	186	163
5 years in 10	223	201	179
2 years in 10	236	215	194
1 year in 10	243	222	202

[1]Recorded in the period 1951-75 at Mohonk Lake, N.Y.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AA	Alluvial land	5,246	0.7
AcB	Arnot channery silt loam, 0 to 8 percent slopes	4,556	0.6
ARD	Arnot-Lordstown-Rock outcrop complex, moderately steep	23,639	3.2
ARF	Arnot-Oquaga-Rock outcrop complex, very steep	100,698	13.8
At	Atherton silt loam	3,605	0.5
Ba	Barbour loam	1,401	0.2
Be	Basher silt loam	336	(1)
BgC	Bath gravelly silt loam, 8 to 15 percent slopes	4,314	0.6
BgD	Bath gravelly silt loam, 15 to 25 percent slopes	1,049	0.1
BHE	Bath very stony soils, steep	1,130	0.2
BnC	Bath-Nassau complex, 8 to 25 percent slopes	23,098	3.2
BOD	Bath-Nassau-Rock outcrop complex, hilly	29,739	4.1
BRC	Bath and Mardin very stony soils, sloping	6,426	0.9
CaB	Cambridge gravelly silt loam, 3 to 8 percent slopes	1,319	0.2
CaC	Cambridge gravelly silt loam, 8 to 15 percent slopes	503	0.1
Cc	Canandaigua silt loam	5,122	0.7
Cd	Canandaigua silt loam, till substratum	4,034	0.6
Ce	Carlisle muck	3,788	0.5
CgA	Castile gravelly silt loam, 0 to 3 percent slopes	932	0.1
CgB	Castile gravelly silt loam, 3 to 8 percent slopes	1,062	0.1
CkB	Cayuga silt loam, 3 to 8 percent slopes	1,619	0.2
CkC	Cayuga silt loam, 8 to 15 percent slopes	483	0.1
CnA	Chenango gravelly silt loam, 0 to 3 percent slopes	1,139	0.2
CnB	Chenango gravelly silt loam, 3 to 8 percent slopes	4,912	0.7
CnC	Chenango gravelly silt loam, 8 to 15 percent slopes	781	0.1
CvA	Churchville silt loam, 0 to 3 percent slopes	2,786	0.4
CvB	Churchville silt loam, 3 to 8 percent slopes	5,053	0.7
FAE	Farmington-Rock outcrop complex, steep	3,526	0.5
FW	Fresh water marsh	630	0.1
Ha	Hamlin silt loam	1,345	0.2
He	Haven loam	1,502	0.2
HfA	Hoosic cobbly loam, 0 to 3 percent slopes	803	0.1
HgA	Hoosic gravelly loam, 0 to 3 percent slopes	2,319	0.3
HgB	Hoosic gravelly loam, 3 to 8 percent slopes	7,495	1.0
HgC	Hoosic gravelly loam, rolling	8,704	1.2
HgD	Hoosic gravelly loam, 15 to 25 percent slopes	1,936	0.3
HSF	Hoosic soils, very steep	2,580	0.4
HuB	Hudson silt loam, 3 to 8 percent slopes	2,266	0.3
HuC	Hudson silt loam, 8 to 15 percent slopes	1,500	0.2
HvC3	Hudson and Schoharie silty clay loams, 8 to 15 percent slopes, severely eroded	155	(1)
HwD	Hudson and Schoharie soils, 15 to 25 percent slopes	2,223	0.3
HXE	Hudson and Schoharie soils, steep	1,426	0.2
LaB	Lackawanna flaggy silt loam, 3 to 8 percent slopes	279	(1)
LaC	Lackawanna flaggy silt loam, 8 to 15 percent slopes	742	0.1
LCD	Lackawanna and Swartswood very bouldery soils, moderately steep	24,927	3.4
LCF	Lackawanna and Swartswood very bouldery soils, very steep	10,588	1.5
LEE	Lackawanna and Swartswood extremely bouldery soils, steep	13,172	1.8
Lm	Lamson fine sandy loam	2,191	0.3
LnB	Lordstown channery silt loam, 3 to 8 percent slopes	1,768	0.2
LOC	Lordstown-Arnot-Rock outcrop complex, sloping	46,587	6.4
LY	Lyons-Atherton complex, very stony	5,572	0.8
Ma	Madalin silty clay loam	4,342	0.6
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes	6,170	0.8
MgB	Mardin-Nassau complex, 3 to 8 percent slopes	14,583	2.0
Mn	Menlo silt loam	1,487	0.2
MO	Menlo very bouldery soils	3,820	0.5
Mr	Middlebury silt loam	1,307	0.2
MTB	Morris-Tuller complex, very bouldery, gently sloping	3,720	0.5
NBF	Nassau-Bath-Rock outcrop complex, very steep	18,608	2.5
NMC	Nassau-Manlius shaly silt loams, rolling	3,470	0.5
NNF	Nassau-Manlius complex, very steep	4,715	0.6
NOD	Nassau-Rock outcrop complex, hilly	680	0.1
OdA	Odessa silt loam, 0 to 3 percent slopes	1,488	0.2
OdB	Odessa silt loam, 3 to 8 percent slopes	1,706	0.2
OgB	Oquaga channery silt loam, 3 to 8 percent slopes	656	0.1
OlC	Oquaga and Lordstown channery silt loams, 8 to 15 percent slopes	1,153	0.2
ORC	Oquaga-Arnot-Rock outcrop complex, sloping	24,294	3.3
ORD	Oquaga-Arnot-Rock outcrop complex, moderately steep	50,963	7.0
Pa	Palms muck	4,325	0.6
Pb	Palms muck, bedrock Variant	270	(1)

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
PlB	Plainfield loamy sand, 0 to 8 percent slopes	2,727	0.4
PlC	Plainfield loamy sand, 8 to 15 percent slopes	805	0.1
PmD	Plainfield-Riverhead complex, moderately steep	1,012	0.1
PmF	Plainfield-Riverhead complex, very steep	1,179	0.2
PrC	Plainfield-Rock outcrop complex, rolling	3,271	0.4
Pt	Pompton fine sandy loam	863	0.1
Ra	Raynham silt loam	4,598	0.6
Re	Red Hook gravelly silt loam	2,587	0.4
RhA	Rhinebeck silt loam, 0 to 3 percent slopes	4,130	0.6
RhB	Rhinebeck silt loam, 3 to 8 percent slopes	2,090	0.3
RvA	Riverhead fine sandy loam, 0 to 3 percent slopes	3,114	0.4
RvB	Riverhead fine sandy loam, 3 to 8 percent slopes	2,675	0.4
RvC	Riverhead fine sandy loam, 8 to 15 percent slopes	798	0.1
RXC	Rock outcrop-Arnot complex, sloping	8,867	1.2
RXE	Rock outcrop-Arnot complex, steep	11,187	1.5
RXF	Rock outcrop-Arnot complex, very steep	31,258	4.3
SaB	Schoharie silt loam, 3 to 8 percent slopes	2,145	0.3
SaC	Schoharie silt loam, 8 to 15 percent slopes	2,013	0.3
Sc	Scio silt loam	1,034	0.1
SdB	Scriba and Morris soils, 0 to 8 percent slopes	439	0.1
SEB	Scriba and Morris very bouldery soils, gently sloping	8,927	1.2
SGB	Scriba and Morris extremely bouldery soils, gently sloping	2,720	0.4
SmB	Stockbridge-Farmington gravelly silt loams, 3 to 8 percent slope	1,441	0.2
SmC	Stockbridge-Farmington gravelly silt loams, 8 to 15 percent slopes	693	0.1
STD	Stockbridge-Farmington-Rock outcrop complex, hilly	5,916	0.8
Su	Suncook loamy fine sand	2,531	0.3
SwB	Swartswood stony fine sandy loam, 3 to 8 percent slopes	424	0.1
SwC	Swartswood stony fine sandy loam, 8 to 15 percent slopes	238	([1])
Te	Teel silt loam	1,093	0.2
Tg	Tioga fine sandy loam	1,695	0.2
TkA	Tunkhannock gravelly loam, 0 to 3 percent slopes	951	0.1
TkB	Tunkhannock gravelly loam, 3 to 8 percent slopes	1,927	0.3
TkC	Tunkhannock gravelly loam, rolling	1,251	0.2
TuB	Tunkhannock gravelly loam, clayey substratum, 3 to 8 percent slopes	165	([1])
TuC	Tunkhannock gravelly loam, clayey substratum, 8 to 15 percent slopes	229	([1])
TuD	Tunkhannock gravelly loam, clayey substratum, 15 to 25 percent slopes	118	([1])
Un	Unadilla silt loam	4,944	0.7
VAB	Valois very bouldery soils, gently sloping	8,566	1.2
VAD	Valois very bouldery soils, moderately steep	4,111	0.6
VoA	Volusia gravelly silt loam, 0 to 3 percent slopes	1,747	0.2
VoB	Volusia gravelly silt loam, 3 to 8 percent slopes	3,070	0.4
VoC	Volusia gravelly silt loam, 8 to 15 percent slopes	244	([1])
VSB	Volusia very stony soils, gently sloping	5,354	0.7
Wa	Walpole fine sandy loam	685	0.1
Wb	Wayland silt loam	2,536	0.3
Wc	Wayland mucky silt loam	966	0.1
WeB	Wellsboro flaggy silt loam, 3 to 8 percent slopes	396	0.1
WeC	Wellsboro flaggy silt loam, 8 to 15 percent slopes	201	([1])
WLB	Wellsboro and Wurtsboro very bouldery soils, gently sloping	31,983	4.4
WOB	Wellsboro and Wurtsboro extremely bouldery soils, gently sloping	4,866	0.7
WsA	Williamson silt loam, 0 to 3 percent slopes	298	([1])
WsB	Williamson silt loam, 3 to 8 percent slopes	1,775	0.2
WuB	Wurtsboro stony loam, 3 to 8 percent slopes	224	([1])
	Borrow pit	433	0.1
	Clay pit	318	([1])
	Cut and fill land	1,253	0.2
	Gravel pit	897	0.1
	Made land	682	0.1
	Quarry	3,838	0.5
	Water	4,259	0.6
	Total	731,520	100.0

[1]Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop is generally not grown on the soil]

Soil name and map symbol	Alfalfa hay	Corn	Corn silage	Sweet corn	Grass-legume hay	Pasture	Apples
	Ton	Bu	Ton	Ton	Ton	AUM[1]	Box
AA: Alluvial land	---	---	---	---	---	3.0	---
AcB: Arnot	---	---	14	---	2.0	3.0	---
[2]ARD: Arnot-Lordstown-Rock outcrop	---	---	---	---	---	2.0	---
[2]ARF: Arnot-Oquaga-Rock outcrop	---	---	---	---	---	---	---
At: Atherton	---	---	---	---	2.5	5.5	---
Ba: Barbour	4.5	120	24	---	4.5	8.0	---
Be: Basher	3.5	90	18	---	3.5	7.0	---
BgC: Bath	3.5	90	19	3.0	3.5	7.0	450
BgD: Bath	---	---	17	---	3.0	6.0	400
[2]BHE: Bath	---	---	---	---	---	---	---
[2]BnC: Bath-Nassau	3.0	---	16	---	3.0	5.0	400
[2]BOD: Bath-Nassau-Rock outcrop	---	---	---	---	---	4.0	250
[2]BRC: Bath and Mardin	---	---	---	---	---	---	---
CaB: Cambridge	2.5	85	17	3.5	3.0	6.5	350
CaC: Cambridge	3.0	85	17	3.0	3.0	6.5	350
Cc, Cd: Canandaigua	---	---	17	---	3.0	6.0	---
Ce: Carlisle	---	---	---	---	---	---	---
CgA: Castile	3.0	95	19	4.0	3.0	7.0	350
CgB: Castile	3.0	95	19	4.0	3.0	7.0	350
CkB: Cayuga	3.0	85	17	---	3.5	6.5	---
CkC: Cayuga	3.0	75	15	---	3.5	6.0	---

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay	Corn	Corn silage	Sweet corn	Grass-legume hay	Pasture	Apples
	Ton	Bu	Ton	Ton	Ton	AUM[1]	Box
CnA, CnB----------------- Chenango	4.5	100	20	4.0	3.5	6.0	450
CnC---------------------- Chenango	4.5	90	18	3.0	3.5	5.5	450
CvA, CvB----------------- Churchville	---	---	17	---	3.0	5.5	---
[2]FAE-------------------- Farmington-Rock outcrop	---	---	---	---	---	2.0	---
FW----------------------- Fresh water marsh	---	---	---	---	---	---	---
Ha----------------------- Hamlin	5.0	130	26	6.0	4.5	8.5	---
He----------------------- Haven	5.0	140	28	5.5	4.0	7.5	---
HfA---------------------- Hoosic	---	---	12	---	2.5	4.5	---
HgA---------------------- Hoosic	3.5	---	15	3.0	3.0	4.5	350
HgB---------------------- Hoosic	3.5	---	15	3.0	3.0	4.5	350
HgC---------------------- Hoosic	3.5	---	13	---	3.0	4.5	350
HgD---------------------- Hoosic	3.0	---	---	---	2.5	4.0	300
HSF---------------------- Hoosic	---	---	---	---	---	---	---
HuB---------------------- Hudson	3.0	85	20	---	3.5	6.5	---
HuC---------------------- Hudson	3.0	75	18	---	3.5	6.0	---
[2]HvC3------------------- Hudson and Schoharie	2.0	---	16	---	3.0	5.0	---
[2]HwD-------------------- Hudson and Schoharie	2.0	---	---	---	3.0	5.0	---
[2]HXE-------------------- Hudson and Schoharie	---	---	---	---	---	---	---
LaB---------------------- Lackawanna	---	---	---	---	3.5	7.0	---
LaC---------------------- Lackawanna	---	---	---	---	3.5	7.0	---
[2]LCD-------------------- Lackawanna and Swartswood	---	---	---	---	---	2.0	---
[2]LCF-------------------- Lackawanna and Swartswood	---	---	---	---	---	---	---
[2]LEE-------------------- Lackawanna and Swartswood	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay	Corn	Corn silage	Sweet corn	Grass-legume hay	Pasture	Apples
	Ton	Bu	Ton	Ton	Ton	AUM[1]	Box
Lm---------------------- Lamson	---	---	17	---	2.5	5.5	---
LnB--------------------- Lordstown	3.5	85	17	---	3.0	6.0	---
[2]LOC------------------- Lordstown-Arnot-Rock outcrop	---	---	---	---	---	3.0	---
[2]LY-------------------- Lyons-Atherton	---	---	---	---	---	---	---
Ma---------------------- Madalin	---	---	12	---	2.5	5.0	---
MdB--------------------- Mardin	2.5	85	18	3.5	3.0	6.5	400
[2]MgB------------------- Mardin-Nassau	2.0	---	16	---	3.0	6.0	350
Mn, MO------------------ Menlo	---	---	---	---	---	3.0	---
Mr---------------------- Middlebury	4.0	100	20	5.0	4.0	7.5	---
[2]MTB------------------- Morris-Tuller	---	---	---	---	---	2.0	---
[2]NBF------------------- Nassau-Bath-Rock outcrop	---	---	---	---	---	---	---
[2]NMC------------------- Nassau-Manlius	---	---	---	---	2.5	5.0	---
[2]NNF------------------- Nassau-Manlius	---	---	---	---	---	---	---
[2]NOD------------------- Nassau-Rock outcrop	---	---	---	---	---	2.0	---
OdA--------------------- Odessa	---	---	17	---	3.0	5.5	---
OdB--------------------- Odessa	---	---	17	---	3.0	5.5	---
OgB--------------------- Oquaga	3.5	---	17	---	3.0	6.0	---
[2]OlC------------------- Oquaga and Lordstown	3.5	---	15	---	3.0	6.0	---
[2]ORC------------------- Oquaga-Arnot-Rock outcrop	---	---	---	---	---	---	---
[2]ORD------------------- Oquaga-Arnot-Rock outcrop	---	---	---	---	---	---	---
Pa---------------------- Palms	---	---	---	---	---	---	---
Pb---------------------- Palms bedrock Variant	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay	Corn	Corn silage	Sweet corn	Grass-legume hay	Pasture	Apples
	Ton	Bu	Ton	Ton	Ton	AUM[1]	Box
PlB--------------------- Plainfield	3.5	---	10	3.5	2.5	3.5	---
PlC--------------------- Plainfield	3.0	---	---	---	1.7	3.0	---
[2]PmD--------------------- Plainfield-Riverhead	---	---	---	---	1.5	3.0	---
[2]PmF--------------------- Plainfield-Riverhead	---	---	---	---	---	---	---
[2]PrC--------------------- Plainfield-Rock outcrop	---	---	---	---	---	2.5	---
Pt--------------------- Pompton	3.0	100	20	4.5	3.0	6.0	350
Ra--------------------- Raynham	---	90	18	5.0	3.0	5.5	200
Re--------------------- Red Hook	---	85	17	---	3.0	5.5	200
RhA, RhB--------------------- Rhinebeck	---	---	17	---	3.0	5.5	---
RvA, RvB--------------------- Riverhead	4.0	105	20	4.5	3.0	5.5	350
RvC--------------------- Riverhead	4.0	95	18	4.0	3.0	5.5	350
[2]RXC--------------------- Rock outcrop-Arnot	---	---	---	---	---	1.5	---
[2]RxE, [2]RxF--------------------- Rock outcrop-Arnot	---	---	---	---	---	---	---
SaB--------------------- Schoharie	3.0	85	20	---	3.5	6.5	---
SaC--------------------- Schoharie	3.0	75	18	---	3.5	6.0	---
Sc--------------------- Scio	4.0	110	22	5.0	4.0	7.5	---
[2]SdB--------------------- Scriba and Morris	---	---	---	---	3.0	5.5	---
[2]SEB--------------------- Scriba and Morris	---	---	---	---	---	---	---
[2]SGB--------------------- Scriba and Morris	---	---	---	---	---	---	---
[2]SmB--------------------- Stockbridge-Farmington	4.0	---	18	---	3.5	6.5	400
[2]SmC--------------------- Stockbridge-Farmington	4.0	---	16	---	3.0	6.0	400
[2]STD--------------------- Stockbridge-Farmington-Rock outcrop	---	---	---	---	---	4.0	---

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay	Corn	Corn silage	Sweet corn	Grass-legume hay	Pasture	Apples
	Ton	Bu	Ton	Ton	Ton	AUM[1]	Box
Su----------------------- Suncook	3.5	---	10	3.5	2.5	3.5	---
SwB---------------------- Swartswood	---	---	19	---	3.5	6.5	---
SwC---------------------- Swartswood	---	---	17	---	3.5	6.0	---
Te----------------------- Teel	4.0	100	20	5.0	4.0	7.5	---
Tg----------------------- Tioga	5.0	130	26	6.0	4.5	8.5	---
TkA, TkB----------------- Tunkhannock	4.0	90	18	---	3.5	6.0	---
TkC---------------------- Tunkhannock	3.5	75	15	---	3.0	5.5	---
TuB---------------------- Tunkhannock	4.0	90	18	---	3.5	6.0	---
TuC---------------------- Tunkhannock	3.5	75	15	---	3.0	5.5	---
TuD---------------------- Tunkhannock	---	---	---	---	2.5	5.0	---
Un----------------------- Unadilla	5.5	150	30	7.0	4.5	8.5	---
[2]VAB, [2]VAD--------------- Valois	---	---	---	---	---	2.0	---
VoA---------------------- Volusia	---	75	15	---	3.0	5.5	200
VoB---------------------- Volusia	---	80	16	---	3.0	5.5	200
VoC---------------------- Volusia	---	70	14	---	3.0	5.5	250
VSB---------------------- Volusia	---	---	---	---	---	2.0	---
Wa----------------------- Walpole	---	85	17	---	3.0	5.5	200
Wb----------------------- Wayland	---	85	17	---	3.0	5.5	---
Wc----------------------- Wayland	---	---	---	---	---	3.0	---
WeB---------------------- Wellsboro	---	---	---	---	3.0	6.5	---
WeC---------------------- Wellsboro	---	---	---	---	3.0	6.5	---
[2]WLB--------------------- Wellsboro and Wurtsboro	---	---	---	---	---	2.0	---
[2]WOB--------------------- Wellsboro and Wurtsboro	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay	Corn	Corn silage	Sweet corn	Grass-legume hay	Pasture	Apples
	Ton	Bu	Ton	Ton	Ton	AUM[1]	Box
WsA-----Williamson	3.0	95	19	5.0	3.0	7.0	300
WsB-----Williamson	3.0	95	19	5.0	3.0	7.0	350
WuB-----Wurtsboro	---	---	17	---	3.0	6.5	---

[1]Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

[2]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	6,446	---	---	---
II	45,290	20,103	10,304	14,883
III	103,526	35,030	52,621	15,875
IV	49,947	30,284	10,154	9,509
V	5,246	---	5,246	---
VI	156,981	---	---	156,981
VII	300,462	5,185	270	295,007
VIII	51,942	---	630	51,312

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available. Areas of Rock outcrop are too variable to be estimated]

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
AcB----------------- Arnot	5d	Slight	Slight	Severe	Moderate	Northern red oak---- Sugar maple--------- Eastern white pine-- White ash-----------	55 50 55 60	Eastern white pine, red pine, Scotch pine, European larch.
[1]ARD:								
Arnot-------------	5d	Slight	Moderate	Severe	Moderate	Northern red oak---- Sugar maple--------- Eastern white pine-- White ash-----------	55 50 55 60	Eastern white pine, red pine, Scotch pine, European larch.
Lordstown---------	3r	Slight	Moderate	Slight	Slight	Northern red oak---- Sugar maple--------- White ash-----------	65 60 60	Eastern white pine, European larch, black cherry, red pine, Norway spruce.
Rock outcrop.								
[1]ARF:								
Arnot-------------	5d	Moderate	Severe	Severe	Moderate	Northern red oak---- Sugar maple--------- Eastern white pine-- White ash-----------	55 50 55 60	Eastern white pine, red pine, Scotch pine, European larch.
Oquaga------------	3r	Moderate	Severe	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry-------- Eastern white pine--	65 71 72 75	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
Rock outcrop.								
At----------------- Atherton	4w	Slight	Severe	Severe	Severe	Eastern white pine--	65	Northern white-cedar.
Ba----------------- Barbour	2o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak----	70 80	Eastern white pine, Norway spruce, black walnut.
Be----------------- Basher	2o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- American basswood---	70 80 80	Eastern white pine, black walnut, Norway spruce, European larch.
BgC---------------- Bath	3o	Slight	Slight	Slight	Slight	Northern red oak---- Black cherry-------- Sugar maple---------	65 75 70	Eastern white pine, red pine, Norway spruce, European larch.
BgD---------------- Bath	3r	Slight	Moderate	Slight	Slight	Northern red oak---- Black cherry-------- Sugar maple---------	61 75 70	Eastern white pine, red pine, Norway spruce, European larch.
[1]BHE--------------- Bath	3r	Moderate	Severe	Slight	Slight	Northern red oak---- Black cherry-------- Sugar maple---------	65 75 70	Eastern white pine, red pine, Norway spruce, European larch.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
[1]BnC:								
Bath	3r	Slight	Moderate	Slight	Slight	Northern red oak	65	Eastern white pine,
						Black cherry	75	red pine,
						Sugar maple	70	Norway spruce,
								European larch.
Nassau	5d	Slight	Moderate	Severe	Moderate	Sugar maple	50	Eastern white pine,
						Northern red oak	50	red pine,
						Eastern white pine	55	European larch.
[1]BOD:								
Bath	3r	Slight	Moderate	Slight	Slight	Northern red oak	65	Eastern white pine,
						Black cherry	75	red pine,
						Sugar maple	70	Norway spruce,
								European larch.
Nassau	5d	Slight	Moderate	Severe	Moderate	Sugar maple	50	Eastern white pine,
						Northern red oak	50	red pine,
						Eastern white pine	55	European larch.
Rock outcrop.								
[1]BRC:								
Bath	3o	Slight	Slight	Slight	Slight	Northern red oak	65	Eastern white pine,
						Black cherry	75	red pine,
						Sugar maple	70	Norway spruce,
								European larch.
Mardin	3o	Slight	Slight	Slight	Slight	Sugar maple	60	Red pine,
						Northern red oak	63	European larch,
						Black cherry	75	Norway spruce,
								eastern white pine.
CaB, CaC Cambridge	2o	Slight	Slight	Slight	Slight	Northern red oak	85	Eastern white pine,
						White ash	82	yellow-poplar,
						Sugar maple	70	black cherry,
						Yellow-poplar	85	European larch,
								Norway spruce.
Cc, Cd Canandaigua	4w	Slight	Severe	Severe	Severe	Red maple	65	Northern white-cedar,
						Eastern white pine	65	white spruce.
Ce Carlisle	5w	Slight	Severe	Severe	Severe	Red maple	46	Northern white-cedar,
						White ash	50	Austrian pine,
						Green ash	---	eastern white pine.
						Black cherry	---	
						Swamp white oak	46	
						Butternut	46	
CgA, CgB Castile	3o	Slight	Slight	Slight	Slight	Sugar maple	63	Eastern white pine,
						Northern red oak	70	Norway spruce,
						Black cherry	70	white spruce.
CkB Cayuga	2o	Slight	Slight	Slight	Slight	Sugar maple	70	Eastern white pine,
						White ash	85	red pine,
						Eastern white pine	85	Norway spruce,
						Yellow birch	70	European larch.
CkC Cayuga	2r	Moderate	Slight	Slight	Slight	Sugar maple	70	Eastern white pine,
						White ash	85	red pine,
						Eastern white pine	85	Norway spruce,
						Yellow birch	70	European larch.
CnA, CnB, CnC Chenango	2o	Slight	Slight	Slight	Slight	Sugar maple	70	Eastern white pine,
						Northern red oak	80	red pine,
								European larch.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
CvA, CvB----------- Churchville	3w	Slight	Moderate	Slight	Moderate	Sugar maple--------- Eastern white pine-- Northern red oak----	60 75 70	Eastern white pine, Norway spruce.
[1]FAE:								
Farmington--------	5d	Severe	Severe	Severe	Moderate	Sugar maple--------- Northern red oak---- Eastern white pine--	50 50 55	Eastern white pine, red pine, European larch.
Rock outcrop.								
Ha----------------- Hamlin	2o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	80 70	Eastern white pine, black locust, Norway spruce, black walnut, European larch.
He----------------- Haven	3o	Slight	Slight	Slight	Slight	Eastern white pine-- Northern red oak---- Sugar maple--------- Red pine------------	75 55 65 75	Eastern white pine, red pine, Norway spruce, European larch.
HfA, HgA, HgB, HgC- Hoosic	3o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak----	65 75	Eastern white pine, red pine, European larch.
HgD---------------- Hoosic	3r	Slight	Moderate	Slight	Slight	Sugar maple--------- Northern red oak----	65 75	Eastern white pine, red pine, European larch.
[1]HSF--------------- Hoosic	3r	Moderate	Severe	Slight	Slight	Sugar maple--------- Northern red oak----	65 75	Eastern white pine, red pine, European larch.
HuB---------------- Hudson	2o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	80 70	Eastern white pine, yellow-poplar, black cherry, black walnut.
HuC---------------- Hudson	2r	Moderate	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	80 70	Eastern white pine, yellow-poplar, black cherry, black walnut.
[1]HvC3:								
Hudson------------	2r	Moderate	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	80 70	Eastern white pine, yellow-poplar, black cherry, black walnut.
Schoharie---------	2r	Moderate	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	70 80	Eastern white pine, yellow-poplar, black cherry, black walnut.
[1]HwD:								
Hudson------------	2r	Severe	Moderate	Slight	Slight	Northern red oak---- Sugar maple---------	80 70	Eastern white pine, yellow-poplar, black cherry, black walnut.
Schoharie---------	2r	Severe	Moderate	Slight	Slight	Northern red oak---- Sugar maple---------	70 80	Eastern white pine, yellow-poplar, black cherry, black walnut.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
[1]HXE:								
Hudson	2r	Severe	Severe	Slight	Slight	Northern red oak Sugar maple	80 70	Eastern white pine, yellow-poplar, black cherry, black walnut.
Schoharie	2r	Severe	Severe	Slight	Slight	Northern red oak Sugar maple	70 80	Eastern white pine, yellow-poplar, black cherry, black walnut.
LaB, LaC Lackawanna	3o	Slight	Slight	Slight	Slight	Northern red oak Black cherry Sugar maple White ash	70 75 70 70	Eastern white pine, red pine, Norway spruce, European larch.
[1]LCD:								
Lackawanna	3r	Slight	Moderate	Slight	Slight	Northern red oak Black cherry Sugar maple White ash	70 75 70 70	Eastern white pine, red pine, Norway spruce, European larch.
Swartswood	3r	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple White ash	70 70 70	Red pine, eastern white pine, European larch, Norway spruce.
[1]LCF:								
Lackawanna	3r	Moderate	Severe	Slight	Slight	Northern red oak Black cherry Sugar maple White ash	70 75 70 70	Eastern white pine, red pine, Norway spruce, European larch.
Swartswood.								
[1]LEE:								
Lackawanna	3x	Slight	Moderate	Slight	Slight	Northern red oak Black cherry Sugar maple White ash	70 75 70 70	Eastern white pine, red pine, Norway spruce, European larch.
Swartswood	3x	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple White ash	70 70 70	Red pine, eastern white pine, European larch, Norway spruce.
Lm Lamson	4w	Slight	Severe	Severe	Severe	Eastern white pine Red maple Pin oak Swamp white oak	65 50 70 ---	Northern white-cedar, white spruce.
LnB Lordstown	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple White ash	65 60 60	Eastern white pine, European larch, black cherry, red pine, Norway spruce.
[1]LOC:								
Lordstown	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple White ash	65 60 60	Eastern white pine, European larch, black cherry, red pine, Norway spruce.
Arnot	5d	Slight	Slight	Severe	Moderate	Northern red oak Sugar maple Eastern white pine White ash	55 50 55 60	Eastern white pine, red pine, Scotch pine, European larch.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
[1]LOC:								
Rock outcrop.								
[1]LY:								
Lyons	5w	Slight	Severe	Severe	Severe	Red maple	60	Northern white-cedar.
Atherton	4w	Slight	Severe	Severe	Severe	Eastern white pine	62	Northern white-cedar.
Ma Madalin	5w	Slight	Severe	Severe	Severe	Red maple White ash	50 50	Eastern white pine, northern white-cedar, white spruce.
MdB Mardin	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry	60 63 75	Red pine, European larch, Norway spruce, eastern white pine.
[1]MgB:								
Mardin	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry	60 63 75	Red pine, European larch, Norway spruce, eastern white pine.
Nassau	5d	Slight	Slight	Severe	Moderate	Sugar maple Northern red oak Eastern white pine	50 50 55	Eastern white pine, red pine, European larch.
Mn, MO Menlo	5w	Slight	Severe	Severe	Severe	Red maple Eastern white pine	55 55	Northern white cedar, white spruce.
Mr Middlebury	2o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple Yellow-poplar	80 70 85	Eastern white pine, yellow-poplar, Norway spruce, European larch, black walnut, black cherry.
[1]MTB:								
Morris	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple Black cherry	65 79 69	Eastern white pine, Norway spruce, white spruce.
Tuller	5w	Slight	Severe	Severe	Severe	Red maple Eastern hemlock Sugar maple Northern white-cedar Yellow birch Eastern white pine	55 45 50 40 50 55	Eastern white pine, white spruce, Norway spruce.
[1]NBF:								
Nassau	5d	Moderate	Severe	Severe	Moderate	Sugar maple Northern red oak Eastern white pine	50 50 55	Eastern white pine, red pine, European larch.
Bath	3r	Moderate	Severe	Slight	Slight	Northern red oak Black cherry Sugar maple	65 75 70	Eastern white pine, red pine, Norway spruce, European larch.
Rock outcrop.								
[1]NMC:								
Nassau	5d	Slight	Slight	Severe	Moderate	Sugar maple Northern red oak Eastern white pine	50 50 55	Eastern white pine, red pine, European larch.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Common trees	Site index	
[1]NMC:								
Manlius	3o	Slight	Slight	Slight	Slight	Northern red oak Black cherry Sugar maple	70 70 70	Eastern white pine, red pine, black cherry, Norway spruce, European larch.
[1]NNF:								
Nassau	5d	Moderate	Severe	Severe	Moderate	Sugar maple Northern red oak Eastern white pine	50 50 55	Eastern white pine, red pine, European larch.
Manlius	3r	Moderate	Severe	Slight	Slight	Northern red oak Black cherry Sugar maple	70 70 70	Eastern white pine, red pine, black cherry, Norway spruce, European larch.
[1]NOD:								
Nassau	5d	Slight	Moderate	Severe	Moderate	Sugar maple Northern red oak Eastern white pine	50 50 55	Eastern white pine, red pine, European larch.
Rock outcrop.								
OdA, OdB Odessa	3w	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak Eastern white pine	65 65 70	Eastern white pine, white spruce, Norway spruce.
OgB Oquaga	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry Eastern white pine	65 71 72 75	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
[1]OlC:								
Oquaga	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry Eastern white pine	65 71 72 75	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
Lordstown	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple White ash	65 60 60	Eastern white pine, European larch, black cherry, red pine, Norway spruce.
[1]ORC:								
Oquaga	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry Eastern white pine	65 71 72 75	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
Arnot	5d	Slight	Slight	Severe	Moderate	Northern red oak Sugar maple Eastern white pine White ash	55 50 55 60	Eastern white pine, red pine, Scotch pine, European larch.
Rock outcrop.								
[1]ORD:								
Oquaga	3r	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak Black cherry Eastern white pine	65 71 72 75	Eastern white pine, red pine, European larch, Norway spruce, black cherry.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
[1]ORD:								
Arnot	5d	Slight	Moderate	Severe	Moderate	Northern red oak	55	Eastern white pine,
						Sugar maple	50	red pine,
						Eastern white pine	55	Scotch pine,
						White ash	60	European larch.
Rock outcrop.								
Pa: Palms	5w	Slight	Severe	Severe	Severe	Red maple	51	
						Silver maple	76	
						White ash	51	
						Quaking aspen	56	
						Northern white-cedar	27	
						Tamarack	45	
						Black ash	---	
Pb: Palms bedrock Variant	4w	Slight	Severe	Severe	Severe	Red maple	46	
PlB, PlC: Plainfield	4s	Slight	Slight	Severe	Slight	Red pine	55	Red pine,
						Eastern white pine	65	eastern white pine.
						Northern pin oak	60	
[1]PmD:								
Plainfield	4s	Moderate	Severe	Moderate	Slight	Red pine	55	Red pine,
						Eastern white pine	65	eastern white pine.
						Northern pin oak	60	
Riverhead	3r	Slight	Moderate	Slight	Slight	Sugar maple	63	Eastern white pine,
						Northern red oak	70	Norway spruce,
						Black cherry	70	European larch.
						Eastern white pine	75	
[1]PmF:								
Plainfield	4s	Moderate	Severe	Moderate	Slight	Red pine	55	Red pine,
						Eastern white pine	65	eastern white pine.
						Northern pin oak	60	
Riverhead	3r	Moderate	Severe	Slight	Slight	Sugar maple	63	Eastern white pine,
						Northern red oak	70	Norway spruce,
						Black cherry	---	European larch.
[1]PrC:								
Plainfield	4s	Moderate	Severe	Moderate	Slight	Red pine	55	Red pine,
						Eastern white pine	65	eastern white pine.
						Northern pin oak	60	
Rock outcrop.								
Pt: Pompton	3o	Slight	Slight	Slight	Slight	White ash	70	Eastern white pine,
						White oak	70	red pine,
						Northern red oak	70	European larch.
Ra: Raynham	3w	Slight	Severe	Severe	Severe	Eastern white pine	65	Eastern white pine,
						White spruce	55	white spruce,
						Red spruce	45	northern white-cedar.
Re: Red Hook	3w	Slight	Moderate	Moderate	Moderate	Red maple	70	Eastern white pine,
						Eastern white pine	70	Norway spruce.
RhA, RhB: Rhinebeck	3w	Slight	Moderate	Slight	Slight	Sugar maple	65	Eastern white pine,
						Northern red oak	70	Norway spruce,
								European larch.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Trees to plant
RvA, RvB, RvC------ Riverhead	3o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry-------- Eastern white pine--	63 70 70 75	Eastern white pine, Norway spruce, European larch.
[1]RXC: Rock outcrop.								
Arnot-------------	5d	Slight	Slight	Severe	Moderate	Northern red oak---- Sugar maple--------- Eastern white pine-- White ash-----------	55 50 55 60	Eastern white pine, red pine, Scotch pine, European larch.
[1]RXE: Rock outcrop.								
Arnot-------------	5d	Slight	Moderate	Severe	Moderate	Northern red oak---- Sugar maple--------- Eastern white pine-- White ash-----------	55 50 55 60	Eastern white pine, red pine, Scotch pine, European larch.
[1]RXF: Rock outcrop.								
Arnot-------------	5x	Moderate	Severe	Severe	Moderate	Northern red oak---- Sugar maple--------- Eastern white pine-- White ash-----------	55 50 55 60	Eastern white pine, red pine, Scotch pine, European larch.
SaB---------------- Schoharie	2o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	80 70	Eastern white pine, yellow-poplar, black cherry, black walnut.
SaC---------------- Schoharie	2r	Moderate	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	80 70	Eastern white pine, yellow-poplar, black cherry, black walnut.
Sc----------------- Scio	2o	Slight	Slight	Slight	Slight	Northern red oak---- White ash----------- Sugar maple--------- Black cherry-------- Eastern hemlock----- Eastern white pine--	75 75 70 --- --- ---	European larch, eastern white pine, red pine, Norway spruce, white spruce.
[1]SdB: Scriba------------	3w	Slight	Moderate	Moderate	Moderate	Northern red oak---- Sugar maple--------- Black cherry--------	75 60 65	Eastern white pine, white spruce, Norway spruce.
Morris------------	3w	Slight	Moderate	Moderate	Moderate	Northern red oak---- Sugar maple--------- Black cherry-------- White ash-----------	65 79 69 71	Eastern white pine, Norway spruce, white spruce, European larch.
[1]SEB: Scriba------------	3w	Slight	Moderate	Moderate	Moderate	Northern red oak---- Sugar maple--------- Black cherry--------	75 60 65	Eastern white pine, white spruce, Norway spruce.
Morris------------	3w	Slight	Moderate	Moderate	Moderate	Northern red oak---- Sugar maple--------- Black cherry--------	65 79 69	Eastern white pine, Norway spruce, white spruce.
[1]SGB: Scriba------------	3x	Slight	Moderate	Moderate	Moderate	Northern red oak---- Sugar maple--------- Black cherry--------	75 60 65	Eastern white pine, white spruce, Norway spruce.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
Morris	3x	Slight	Moderate	Moderate	Moderate	White ash	71	European larch.
[1]SmB, [1]SmC:								
Stockbridge	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple Eastern white pine	70 60 75	Eastern white pine, white spruce, Norway spruce, European larch.
Farmington	5d	Slight	Slight	Severe	Moderate	Sugar maple Northern red oak Eastern white pine	50 50 55	Eastern white pine, red pine, European larch.
[1]STD:								
Stockbridge	3r	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple Eastern white pine	70 60 75	Eastern white pine, white spruce, Norway spruce, European larch.
Farmington	5d	Moderate	Moderate	Severe	Moderate	Sugar maple Northern red oak Eastern white pine	50 50 55	Eastern white pine, red pine, European larch.
Rock outcrop.								
Su Suncook	5s	Slight	Slight	Severe	Slight	Eastern white pine Black oak Northern red oak Red maple	55 50 50 50	Eastern white pine, red pine.
SwB, SwC Swartswood	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple White ash	70 70 70	Red pine, eastern white pine, European larch, Norway spruce.
Te Teel	2o	Slight	Slight	Slight	Slight	Sugar maple White ash Eastern white pine American basswood	70 85 85 85	Eastern white pine, Norway spruce, black walnut, European larch.
Tg Tioga	2o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Sugar maple	75 85 67	Eastern white pine, yellow-poplar, Norway spruce, black walnut, European larch.
TkA, TkB, TkC, TuB, TuC Tunkhannock	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple	70 65	Eastern white pine, red pine, European larch, Norway spruce.
TuD Tunkhannock	3r	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple	70 65	Eastern white pine, red pine, European larch, Norway spruce.
Un Unadilla	2o	Slight	Slight	Slight	Slight	Sugar maple Eastern white pine Northern red oak Black cherry White ash	70 85 80 80 80	Eastern white pine, Norway spruce, black cherry, European larch, red pine, white spruce.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
[1]VAB---------------- Valois	3o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak----	61 70	Eastern white pine, white spruce, Norway spruce, red pine.
[1]VAD---------------- Valois	3r	Slight	Moderate	Slight	Slight	Sugar maple--------- Northern red oak----	61 70	Eastern white pine, white spruce, Norway spruce, red pine.
VoA, VoB, VoC, [1]VSB-------------- Volusia	3w	Slight	Moderate	Moderate	Moderate	Northern red oak---- Sugar maple--------- White ash-----------	62 64 75	Eastern white pine, Norway spruce, European larch, white spruce, black cherry.
Wa------------------ Walpole	3w	Slight	Moderate	Moderate	Moderate	Eastern white pine-- Red spruce---------- Red maple-----------	75 50 75	Eastern white pine, white spruce, northern white-cedar, Norway spruce.
Wb, Wc-------------- Wayland	4w	Slight	Severe	Severe	Severe	Red maple-----------	65	
WeB, WeC------------ Wellsboro	3o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	70 65	Norway spruce, eastern white pine, red pine, black cherry, European larch.
[1]WLB:								
Wellsboro----------	3o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	70 65	Norway spruce, eastern white pine, red pine, black cherry.
Wurtsboro----------	3o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	70 70	Norway spruce, eastern white pine, red pine, black cherry.
[1]WOB:								
Wellsboro----------	3x	Slight	Moderate	Slight	Slight	Northern red oak---- Sugar maple---------	70 65	Norway spruce, eastern white pine, red pine, black cherry.
Wurtsboro----------	3x	Slight	Moderate	Slight	Slight	Northern red oak---- Sugar maple---------	70 70	European larch, Norway spruce, eastern white pine, black cherry.
WsA, WsB------------ Williamson	3o	Slight	Slight	Slight	Slight	Eastern white pine-- Sugar maple---------	75 65	Eastern white pine, red pine, European larch, Norway spruce, white spruce, black locust.
WuB----------------- Wurtsboro	3o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	70 70	Norway spruce, eastern white pine, red pine, black cherry, European larch.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 8.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Areas of Rock outcrop, Alluvial land, and Fresh water marsh are too variable to be estimated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AA. Alluvial land						
AcB: Arnot	Severe: depth to rock, small stones.	Severe: depth to rock.	Severe: depth to rock, wetness.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
[1]ARD:						
Arnot	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope, depth to rock, wetness.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Lordstown	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
[1]ARF:						
Arnot	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope, depth to rock, wetness.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Oquaga	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
At: Atherton	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.	Severe: wetness.
Ba: Barbour	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
Be: Basher	Severe: floods, wetness.	Severe: floods, frost action.	Severe: floods, wetness.	Severe: floods, frost action.	Severe: floods, frost action.	Moderate: floods.
BgC: Bath	Moderate: slope, wetness, small stones.	Moderate: slope, frost action.	Moderate: slope, wetness.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, small stones.
BgD, [1]BHE: Bath	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]BnC:						
Bath	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Nassau	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
[1]BOD:						
Bath	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Nassau	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.

See footnotes at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
[1]BOD:						
Rock outcrop.						
[1]BRC:						
Bath	Moderate: slope, large stones, wetness.	Moderate: slope, large stones, frost action.	Moderate: slope, large stones, wetness.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, large stones.
Mardin	Moderate: slope, wetness.	Severe: frost action.	Moderate: wetness, frost action.	Severe: slope, frost action.	Moderate: frost action, slope.	Moderate: large stones.
CaB: Cambridge	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: frost action.	Slight.
CaC: Cambridge	Severe: slope, wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Moderate: frost action, slope.	Moderate: slope.
[2]Cc, [2]Cd: Canandaigua	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.	Severe: wetness.
Ce: Carlisle	Severe: floods, wetness, excess humus.	Severe: wetness, subsides, floods.	Severe: wetness, subsides, floods.	Severe: wetness, subsides, floods.	Severe: low strength, wetness, floods.	Severe: excess humus, wetness, floods.
CgA: Castile	Severe: wetness, small stones.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: frost action.	Moderate: small stones.
CgB: Castile	Severe: wetness, small stones.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: slope, wetness.	Moderate: frost action.	Moderate: small stones.
CkB: Cayuga	Moderate: wetness, too clayey.	Moderate: frost action.	Severe: wetness.	Moderate: slope, frost action.	Moderate: frost action, low strength.	Slight.
CkC: Cayuga	Moderate: slope, wetness, too clayey.	Moderate: slope, frost action.	Severe: wetness.	Severe: slope.	Moderate: slope, frost action, low strength.	Moderate: slope.
CnA: Chenango	Severe: small stones.	Moderate: frost action.	Slight	Moderate: frost action.	Moderate: frost action.	Moderate: small stones.
CnB: Chenango	Severe: small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.	Moderate: small stones.
CnC: Chenango	Severe: small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, small stones.
CvA, CvB: Churchville	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.	Moderate: wetness.
[1]FAE:						
Farmington	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop.						

See footnotes at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
FW. Fresh water marsh						
Ha: Hamlin	Severe: floods.	Severe: floods, frost action.	Severe: floods.	Severe: floods, frost action.	Severe: floods, frost action.	Slight.
[2]He: Haven	Moderate: small stones.	Moderate: frost action.	Slight	Moderate: frost action.	Moderate: frost action.	Slight.
HfA, HgA: Hoosic	Severe: small stones.	Slight	Slight	Slight	Slight	Severe: small stones.
HgB: Hoosic	Severe: small stones.	Slight	Slight	Moderate: slope.	Slight	Severe: small stones.
HgC: Hoosic	Severe: small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones.
HgD, [1]HSF: Hoosic	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
HuB: Hudson	Severe: too clayey, wetness.	Severe: frost action, low strength.	Severe: wetness, low strength.	Severe: frost action, low strength.	Severe: frost action, low strength.	Moderate: too clayey.
HuC: Hudson	Severe: too clayey, wetness.	Severe: frost action, low strength.	Severe: wetness, low strength.	Severe: slope, frost action, low strength.	Severe: frost action, low strength.	Moderate: slope, too clayey.
[1]HvC3:						
Hudson	Severe: too clayey, wetness.	Severe: frost action, low strength.	Severe: wetness, low strength.	Severe: slope, frost action, low strength.	Severe: frost action, low strength.	Moderate: slope, too clayey.
Schoharie	Severe: too clayey.	Severe: low strength.	Severe: wetness, low strength.	Severe: slope, low strength.	Severe: low strength.	Moderate: too clayey.
[1]HwD, [1]HXE:						
Hudson	Severe: slope, too clayey, wetness.	Severe: slope, frost action, low strength.	Severe: slope, wetness, low strength.	Severe: slope, frost action, low strength.	Severe: slope, frost action, low strength.	Severe: slope.
Schoharie	Severe: slope, too clayey.	Severe: slope, low strength.	Severe: slope, wetness, low strength.	Severe: slope, low strength.	Severe: slope, low strength.	Severe: slope.
LaB: Lackawanna	Moderate: wetness, small stones.	Moderate: frost action.	Moderate: wetness.	Moderate: slope, frost action.	Moderate: frost action.	Slight.
LaC: Lackawanna	Moderate: slope, wetness, small stones.	Moderate: slope, frost action.	Moderate: slope, wetness.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
[1]LCD, [1]LCF:						
Lackawanna	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Swartswood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnotes at endo f table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
[1]LEE:						
Lackawanna	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.
Swartswood	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, wetness, large stones.	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.
Lm Lamson	Severe: wetness, cutbanks cave.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.	Severe: wetness.
LnB Lordstown	Severe: depth to rock.	Moderate: depth to rock, frost action.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Moderate: depth to rock, small stones.
[1]LOC:						
Lordstown	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Moderate: slope, depth to rock, small stones.
Arnot	Severe: depth to rock, small stones.	Severe: depth to rock.	Severe: depth to rock, wetness.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rock outcrop.						
[1]LY:						
Lyons	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.	Severe: wetness.
Atherton	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.	Severe: wetness, large stones.
Ma Madalin	Severe: wetness, too clayey.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness.
MdB Mardin	Severe: wetness.	Moderate: frost action, wetness.	Severe: wetness.	Moderate: frost action, slope.	Moderate: frost action.	Moderate: small stones.
[1]MgB:						
Mardin	Severe: wetness.	Moderate: frost action, wetness.	Severe: wetness.	Moderate: frost action, slope.	Moderate: frost action.	Moderate: small stones.
Nassau	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Mn, MO Menlo	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.	Severe: wetness.
Mr Middlebury	Severe: floods, wetness.	Severe: floods, frost action.	Severe: floods, wetness.	Severe: floods, frost action.	Severe: frost action, floods.	Slight.
[1]MTB:						
Morris	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: frost action.	Severe: wetness.

See footnotes at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
[1]MTB:						
Tuller	Severe: depth to rock, wetness.	Severe: wetness, depth to rock, frost action.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock, frost action.	Severe: depth to rock, wetness, frost action.	Severe: depth to rock, wetness, large stones.
[1]NBF:						
Nassau	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Bath	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
[1]NMC:						
Nassau	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Manlius	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Moderate: slope, depth to rock, small stones.
[1]NNF:						
Nassau	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Manlius	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
[1]NOD:						
Nassau	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop.						
OdA, OdB: Odessa	Severe: wetness, too clayey.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: low strength.	Moderate: wetness.
OgB: Oquaga	Severe: depth to rock, small stones.	Moderate: depth to rock, frost action.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Moderate: depth to rock.
[1]OlC:						
Oquaga	Severe: depth to rock, small stones.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock.	Moderate: slope, depth to rock.
Lordstown	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock.	Moderate: slope, depth to rock, small stones.
[1]ORC:						
Oquaga	Severe: depth to rock, small stones.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock.	Moderate: slope, depth to rock.
Arnot	Severe: depth to rock, small stones.	Severe: depth to rock.	Severe: depth to rock, wetness.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rock outcrop.						

See footnotes at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
[1]ORD:						
Oquaga	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Arnot	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope, depth to rock, wetness.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop.						
Pa: Palms	Severe: wetness, cutbanks cave, floods.	Severe: wetness, subsides, floods.	Severe: wetness, floods, subsides.	Severe: wetness, floods, subsides.	Severe: wetness, floods, low strength.	Severe: wetness, floods, excess humus.
Pb: Palms bedrock Variant	Severe: depth to rock, wetness, floods.	Severe: wetness, floods, subsides.	Severe: depth to rock, wetness, floods.	Severe: wetness, floods, subsides.	Severe: wetness, low strength, floods.	Severe: wetness.
PlB: Plainfield	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: too sandy.
PlC: Plainfield	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: too sandy, slope.
[1]PmD, [1]PmF:						
Plainfield	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Riverhead	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]PrC:						
Plainfield	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: too sandy, slope.
Rock outcrop.						
Pt: Pompton	Severe: wetness, cutbanks cave.	Severe: wetness, frost action.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: frost action.	Moderate: wetness.
[2]Ra: Raynham	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: frost action.	Moderate: wetness.
Re: Red Hook	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: frost action.	Moderate: wetness, small stones.
RhA, RhB: Rhinebeck	Severe: wetness, too clayey.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.	Severe: low strength.	Moderate: wetness.
RvA: Riverhead	Severe: cutbanks cave.	Moderate: frost action.	Slight	Moderate: frost action.	Moderate: frost action.	Slight.
RvB: Riverhead	Severe: cutbanks cave.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.	Slight.

See footnotes at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
RvC: Riverhead	Severe: cutbanks cave.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
[1]RXC: Rock outcrop.						
Arnot	Severe: depth to rock, small stones.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
[1]RXE: Rock outcrop.						
Arnot	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
[1]RXF: Rock outcrop.						
Arnot	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.
SaB: Schoharie	Severe: too clayey.	Severe: low strength.	Severe: wetness, low strength.	Severe: low strength.	Severe: low strength.	Moderate: too clayey.
SaC: Schoharie	Severe: too clayey.	Severe: low strength.	Severe: wetness, low strength.	Severe: slope, low strength.	Severe: low strength.	Moderate: too clayey.
[2]Sc: Scio	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.	Slight.
[1]SdB: Scriba	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.	Moderate: wetness.
Morris	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: frost action, wetness.	Severe: frost action.	Moderate: wetness.
[1]SEB: Scriba	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.	Moderate: wetness.
Morris	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: frost action.	Severe: wetness.
[1]SGB: Scriba	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: frost action.	Severe: large stones.
Morris	Severe: wetness, large stones.	Severe: large stones, wetness.	Severe: large stones, wetness.	Severe: large stones, wetness.	Severe: frost action.	Severe: large stones, wetness.
[1]SmB: Stockbridge	Moderate: wetness, depth to rock.	Moderate: frost action.	Moderate: wetness, depth to rock.	Moderate: slope, frost action.	Moderate: frost action.	Slight.

See footnotes at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
[1]SmB:						
Farmington	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
[1]SmC:						
Stockbridge	Moderate: slope, depth to rock.	Moderate: slope, frost action.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Farmington	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
[1]STD:						
Stockbridge	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Farmington	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop.						
Su: Suncook	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: too sandy.
SwB: Swartswood	Moderate: wetness, small stones.	Moderate: frost action.	Moderate: wetness.	Moderate: slope, frost action.	Moderate: frost action.	Moderate: small stones.
SwC: Swartswood	Moderate: slope, wetness, small stones.	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, small stones.
Te: Teel	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods.	Slight.
Tg: Tioga	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Slight.
TkA: Tunkhannock	Severe: small stones.	Moderate: frost action.	Slight	Moderate: frost action.	Moderate: frost action.	Moderate: small stones.
TkB: Tunkhannock	Severe: small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.	Moderate: small stones.
TkC: Tunkhannock	Severe: small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones.
TuB: Tunkhannock	Severe: small stones.	Moderate: frost action.	Moderate: wetness, low strength.	Moderate: slope, frost action.	Moderate: frost action, low strength.	Moderate: small stones.
TuC: Tunkhannock	Severe: small stones.	Moderate: slope, frost action.	Moderate: slope, wetness, low strength.	Severe: slope.	Moderate: slope, frost action. low strength.	Moderate: slope, small stones.
TuD: Tunkhannock	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
[2]Un: Unadilla	Slight	Severe: frost action.	Slight	Severe: frost action.	Severe: frost action.	Slight.

See footnotes at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
[1]VAB: Valois	Moderate: large stones.	Moderate: large stones, frost action.	Moderate: large stones, wetness.	Moderate: large stones, slope.	Moderate: frost action.	Moderate: large stones.
[1]VAD: Valois	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
VoA, VoB: Volusia	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.	Moderate: small stones, wetness.
VoC: Volusia	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: slope, wetness, frost action.	Severe: frost action.	Moderate: slope, small stones, wetness.
[1]VSB: Volusia	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.	Moderate: wetness, large stones.
Wa: Walpole	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Severe: wetness.
Wb, Wc: Wayland	Severe: wetness, floods.	Severe: floods, wetness, frost action.	Severe: floods, wetness.	Severe: floods, wetness, frost action.	Severe: wetness, floods, frost action.	Severe: wetness, floods.
WeB: Wellsboro	Severe: wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: slope, wetness.	Moderate: frost action.	Slight.
WeC: Wellsboro	Severe: wetness.	Moderate: slope, wetness, frost action.	Severe: wetness.	Severe: slope.	Moderate: frost action, slope.	Moderate: slope.
[1]WLB:						
Wellsboro	Severe: wetness.	Moderate: wetness, large stones, frost action.	Severe: wetness.	Moderate: slope, wetness, large stones.	Moderate: frost action.	Moderate: large stones.
Wurtsboro	Severe: wetness.	Moderate: frost action, wetness, large stones.	Severe: wetness.	Moderate: slope, wetness, large stones.	Moderate: frost action.	Moderate: slope, large stones.
[1]WOB:						
Wellsboro	Severe: wetness, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: large stones.	Moderate: frost action, large stones.	Moderate: large stones.
Wurtsboro	Severe: wetness, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: large stones.	Moderate: frost action, large stones.	Severe: large stones.
WsA, WsB: Williamson	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.	Slight.
WuB: Wurtsboro	Severe: wetness.	Moderate: frost action, wetness.	Severe: wetness.	Moderate: slope, frost action, wetness.	Moderate: frost action.	Slight.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.
[2]These soils on low stream terraces are subject to rare flooding or ponding.

TABLE 9.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AA. Alluvial land					
[1]AcB: Arnot	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: small stones, thin layer.
[1 2]ARD:					
Arnot	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, small stones, thin layer.
Lordstown	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Rock outcrop.					
[1 2]ARF:					
Arnot	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones, thin layer.
Oquaga	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Rock outcrop.					
At: Atherton	Severe: wetness.	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness.	Poor: wetness.
Ba: Barbour	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Fair: thin layer.
Be: Basher	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Good.
BgC: Bath	Severe: percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: slope, wetness.	Fair: slope, small stones.
BgD: Bath	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, wetness.	Severe: slope.	Poor: slope.
[2]BHE: Bath	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
[1 2]BnC:					
Bath	Severe: slope, percs slowly.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
[1] [2]BnC:					
Nassau	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
[1] [2]BOD:					
Bath	Severe: slope, percs slowly.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Nassau	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Rock outcrop.					
[2]BRC:					
Bath	Severe: percs slowly.	Severe: slope.	Moderate: large stones, wetness.	Moderate: slope, wetness.	Fair: slope, large stones.
Mardin	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: slope, wetness.	Fair: slope, large stones.
CaB Cambridge	Severe: wetness, percs slowly.	Moderate: slope, small stones.	Moderate: wetness.	Moderate: wetness.	Fair: wetness, small stones.
CaC Cambridge	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: slope, wetness.	Fair: slope, wetness, small stones.
Cc, Cd Canandaigua	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ce Carlisle	Severe: floods, wetness.	Severe: wetness, excess humus, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: wetness, excess humus, hard to pack.
[1]CgA, [1]CgB Castile	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Fair: small stones, thin layer.
CkB Cayuga	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
CkC Cayuga	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: too clayey, slope.
[1]CnA, [1]CnB Chenango	Slight	Severe: seepage, small stones.	Severe: seepage, too sandy.	Severe: seepage.	Fair: small stones, thin layer.
[1]CnC Chenango	Moderate: slope.	Severe: slope, seepage, small stones.	Severe: seepage, too sandy.	Severe: seepage.	Fair: small stones, slope.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CvA----------------- Churchville	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness.	Severe: wetness.	Fair: too clayey, thin layer.
CvB----------------- Churchville	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: too clayey, thin layer.
[1] [2]FAE:					
Farmington---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Rock outcrop.					
FW. Fresh water marsh					
Ha------------------ Hamlin	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
[1]He----------------- Haven	Moderate: wetness.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
[1]HfA, [1]HgA, [1]HgB---- Hoosic	Slight-----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, thin layer.
[1]HgC---------------- Hoosic	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
[1]HgD---------------- Hoosic	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
[1] [2]HSF-------------- Hoosic	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
HuB----------------- Hudson	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, thin layer.
HuC----------------- Hudson	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, thin layer.
[2]HvC3:					
Hudson-------------	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, thin layer.
Schoharie----------	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
[2]HwD:					
Hudson-------------	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: wetness, too clayey.	Severe: slope, wetness.	Poor: slope, too clayey, thin layer.
Schoharie----------	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: wetness, too clayey.	Severe: slope, wetness.	Poor: slope, too clayey.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
[2]HXE:					
Hudson	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: slope, too clayey, wetness.	Severe: slope, wetness.	Poor: slope, too clayey, thin layer.
Schoharie	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: slope, wetness, too clayey.	Severe: slope, wetness.	Poor: slope, too clayey.
LaB: Lackawanna	Severe: percs slowly.	Moderate: slope, small stones.	Moderate: wetness.	Moderate: wetness.	Fair: small stones.
LaC: Lackawanna	Severe: percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: wetness, slope.	Fair: slope, small stones.
[2]LCD:					
Lackawanna	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, large stones.	Severe: slope.	Poor: slope.
Swartswood	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, large stones.	Severe: slope.	Poor: slope.
[2]LCF:					
Lackawanna	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe slope.	Poor: slope.
Swartswood	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
[2]LEE:					
Lackawanna	Severe: slope, percs slowly, large stones.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Poor: slope, large stones.
Swartswood	Severe: slope, percs slowly, large stones.	Severe: slope.	Severe: slope, large stones.	Severe: slope, wetness.	Poor: slope, large stones.
Lm: Lamson	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
[1]LnB: Lordstown	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: small stones, thin layer.
[1 2]LOC:					
Lordstown	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: small stones, slope.
Arnot	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: small stones, thin layer.
Rock outcrop.					

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
2LY:					
Lyons	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Atherton	Severe: wetness.	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
Ma Madalin	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
MdB Mardin	Severe: percs slowly, wetness.	Moderate: small stones, slope.	Severe: wetness.	Slight	Fair: small stones.
1 2MgB:					
Mardin	Severe: percs slowly, wetness.	Moderate: small stones, slope, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness.	Fair: small stones.
Nassau	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
Mn Menlo	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
MO Menlo	Severe: wetness, percs slowly.	Moderate: large stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Mr Middlebury	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
1 2MTB:					
Morris	Severe: percs slowly, wetness.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: large stones.
Tuller	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: thin layer, area reclaim, wetness.
1 2NBF:					
Nassau	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Bath	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Rock outcrop.					
1 2NMC:					
Nassau	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim.
Manlius	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: small stones, thin layer.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
[1] [2]NNF:					
Nassau	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Manlius	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer.
[1] [2]NOD:					
Nassau	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Rock outcrop.					
OdA: Odessa	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
OdB: Odessa	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
[1]OgB: Oquaga	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer.
[1] [2]OlC:					
Oquaga	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer.
Lordstown	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: thin layer, slope.
[1] [2]ORC:					
Oquaga	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer.
Arnot	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: small stones, thin layer.
Rock outcrop.					
[1] [2]ORD:					
Oquaga	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Arnot	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer.
Rock outcrop.					
Pa: Palms	Severe: wetness, floods, subsides.	Severe: wetness, seepage, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: wetness, hard to pack, excess humus.
Pb: Palms bedrock Variant	Severe: depth to rock, wetness, floods.	Severe: depth to rock, wetness, excess humus.	Severe: depth to rock, wetness, floods.	Severe: wetness, floods, seepage.	Poor: excess humus, hard to pack, wetness.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
[1]PlB Plainfield	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
[1]PlC Plainfield	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
[1 2]PmD:					
Plainfield	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope, seepage.
Riverhead	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
[1 2]PmF:					
Plainfield	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope, seepage.
Riverhead	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
[1 2]PrC:					
Plainfield	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
Rock outcrop.					
[1]Pt Pompton	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Fair: thin layer.
Ra Raynham	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Good.
Re Red Hook	Severe: wetness.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones.
RhA Rhinebeck	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
RhB Rhinebeck	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
[1]RvA, [1]RvB Riverhead	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: thin layer, area reclaim.
[1]RvC Riverhead	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, thin layer, area reclaim.
[1 2]RXC:					
Rock outcrop.					
Arnot	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: slope, thin layer.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1 2RXE, 1 2RXF: Rock outcrop.					
Arnot	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer.
SaB Schoharie	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
SaC Schoharie	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
Sc Scio	Severe: wetness.	Moderate: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Good.
2SdB: Scriba	Severe: wetness, percs slowly.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones.
Morris	Severe: percs slowly, wetness.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones.
2SEB: Scriba	Severe: wetness, percs slowly.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: large stones.
Morris	Severe: percs slowly, wetness.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: large stones.
2SGB: Scriba	Severe: wetness, percs slowly, large stones.	Moderate: large stones, slope.	Severe: wetness.	Severe: wetness.	Poor: large stones.
Morris	Severe: large stones, percs slowly, wetness.	Severe: large stones, slope.	Severe: large stones, wetness.	Severe: wetness.	Poor: large stones.
1 2SmB: Stockbridge	Severe: percs slowly.	Moderate: slope, depth to rock.	Severe: depth to rock.	Moderate: wetness.	Fair: small stones.
Farmington	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
1 2SmC: Stockbridge	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: slope, wetness.	Fair: slope, small stones.
Farmington	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim.
1 2STD: Stockbridge	Severe: slope, percs slowly.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
[2]STD:					
Farmington	Severe: depth to rock.	Severe: depth to rock.	Severe:	Severe:	Poor: thin layer, area reclaim.
Rock outcrop.					
Su: Suncook	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Poor: area reclaim, too sandy.
SwB: Swartswood	Severe: percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
SwC: Swartswood	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope.
Te: Teel	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
Tg: Tioga	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
[1]TkA, [1]TkB: Tunkhannock	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, thin layer.
[1]TkC: Tunkhannock	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, thin layer, slope.
TuB: Tunkhannock	Severe: percs slowly.	Severe: seepage.	Severe: too clayey, seepage.	Severe: seepage.	Fair: small stones, thin layer.
TuC: Tunkhannock	Severe: percs slowly.	Severe: slope, seepage.	Severe: too clayey, seepage.	Severe: seepage.	Fair: slope, small stones, thin layer.
TuD: Tunkhannock	Severe: slope, percs slowly.	Severe: slope, seepage.	Severe: too clayey, seepage.	Severe: slope, seepage.	Poor: slope.
Un: Unadilla	Slight	Moderate: seepage.	Slight	Slight	Good.
[2]VAB: Valois	Moderate: large stones.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: large stones.
[2]VAD: Valois	Severe: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage, slope.	Poor: slope.
VoA: Volusia	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones.
VoB: Volusia	Severe: wetness, percs slowly.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones.
VoC: Volusia	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: slope, small stones.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
[2]VSB: Volusia	Severe: wetness, percs slowly.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: large stones.
Wa: Walpole	Severe: wetness.	Severe: wetness, seepage.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: thin layer.
Wb, Wc: Wayland	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
WeB: Wellsboro	Severe: percs slowly, wetness.	Moderate: small stones, slope.	Severe: wetness.	Severe: wetness.	Fair: small stones.
WeC: Wellsboro	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: small stones, slope.
[2]WLB:					
Wellsboro	Severe: wetness, percs slowly.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: large stones.
Wurtsboro	Severe: percs slowly, wetness.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: slope, large stones.
[2]WOB:					
Wellsboro	Severe: wetness, percs slowly, large stones.	Moderate: slope, large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
Wurtsboro	Severe: percs slowly, wetness, large stones.	Moderate: slope, large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
WsA: Williamson	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Good.
WsB: Williamson	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Good.
WuB: Wurtsboro	Severe: percs slowly, wetness.	Moderate: small stones, slope.	Severe: wetness.	Severe: wetness.	Fair: small stones.

[1]Possible pollution hazard to streams, lakes, springs, or underground water supplies because of rapid permeability or fractured bedrock.

[2]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 10.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AA. Alluvial land				
AcB: Arnot	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: small stones, area reclaim.
[1]ARD:				
Arnot	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: slope, large stones, area reclaim.
Lordstown	Poor: slope, thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, large stones.
Rock outcrop.				
[1]ARF:				
Arnot	Poor: slope, thin layer, area reclaim.	Poor: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: slope, large stones, area reclaim.
Oquaga	Poor: slope, thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, large stones.
Rock outcrop.				
At: Atherton	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Ba: Barbour	Fair: frost action.	Fair: excess fines.	Fair: excess fines.	Fair: thin layer.
Be: Basher	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
BgC: Bath	Fair: frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
BgD: Bath	Fair: slope, frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
[1]BHE: Bath	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, large stones.
[1]BnC:				
Bath	Fair: slope, frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Nassau	Poor: thin layer, area reclaim.	Unsuited: thin layer, excess fines.	Poor: thin layer, excess fines.	Poor: slope, area reclaim, small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
[1]BOD:				
Bath	Fair: slope, frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Nassau	Poor: thin layer, area reclaim.	Unsuited: thin layer, excess fines.	Poor: thin layer, excess fines.	Poor: slope, area reclaim, small stones.
Rock outcrop.				
[1]BRC:				
Bath	Fair: frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: large stones.
Mardin	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
CaB Cambridge	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
CaC Cambridge	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Cc, Cd Canandaigua	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Ce Carlisle	Poor: low strength, wetness.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness, excess humus.
CgA, CgB Castile	Fair: frost action.	Fair: excess fines.	Fair: excess fines.	Poor: small stones.
CkB Cayuga	Fair: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
CkC Cayuga	Fair: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
CnA, CnB, CnC Chenango	Fair: frost action.	Fair: excess fines.	Good	Poor: small stones.
CvA, CvB Churchville	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
[1]FAE:				
Farmington	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: thin layer, excess fines.	Poor: slope, area reclaim, large stones.
Rock outcrop.				
FW. Fresh water marsh				
Ha Hamlin	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
He Haven	Fair: frost action.	Good	Good	Good.
HfA, HgA, HgB, HgC Hoosic	Good	Fair: excess fines.	Good	Poor: small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HgD: Hoosic	Fair: slope.	Fair: excess fines.	Good	Poor: slope, small stones.
[1]HSF: Hoosic	Poor: slope.	Fair: excess fines.	Good	Poor: slope, small stones.
HuB: Hudson	Poor: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
HuC: Hudson	Poor: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, thin layer.
[1]HvC3:				
Hudson	Poor: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
Schoharie	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
[1]HwD:				
Hudson	Poor: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Schoharie	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
[1]HXE:				
Hudson	Poor: slope, frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Schoharie	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
LaB, LaC: Lackawanna	Fair: frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
[1]LCD:				
Lackawanna	Fair: slope, frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, large stones.
Swartswood	Fair: slope, frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, large stones.
[1]LCF:				
Lackawanna	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, large stones.
Swartswood	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, large stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
[1]LEE:				
Lackawanna	Poor: slope.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones.
Swartswood	Poor: slope.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones.
Lm Lamson	Poor: wetness, frost action.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.
LnB Lordstown	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines, large stones.	Poor: small stones.
[1]LOC:				
Lordstown	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
Arnot	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: small stones, area reclaim.
Rock outcrop.				
[1]LY:				
Lyons	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, large stones.
Atherton	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, large stones.
Ma Madalin	Poor: low strength, wetness, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, area reclaim.
MdB Mardin	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
[1]MgB:				
Mardin	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Nassau	Poor: thin layer, area reclaim.	Unsuited: thin layer, excess fines.	Poor: thin layer, excess fines.	Poor: area reclaim, small stones.
Mn Menlo	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
MO Menlo	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, large stones.
Mr Middlebury	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
[1]MTB:				
Morris	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Tuller	Poor: thin layer, frost action.	Unsuited: excess fines, thin layer.	Unsuited: excess fines, thin layer.	Poor: large stones, wetness.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
[1]NBF:				
Nassau	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer, excess fines.	Poor: thin layer, excess fines.	Poor: slope, area reclaim, small stones.
Bath	Poor: slope.	Unsuited: excess fines, small stones.	Poor: excess fines.	Poor: slope, small stones.
Rock outcrop.				
[1]NMC:				
Nassau	Poor: thin layer, area reclaim.	Unsuited: thin layer, excess fines.	Poor: thin layer, excess fines.	Poor: area reclaim, small stones.
Manlius	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
[1]NNF:				
Nassau	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer, excess fines.	Poor: thin layer, excess fines.	Poor: slope, area reclaim, small stones.
Manlius	Poor: slope, thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones, slope.
[1]NOD:				
Nassau	Poor: thin layer, area reclaim.	Unsuited: thin layer, excess fines.	Poor: thin layer, excess fines.	Poor: slope, area reclaim, small stones.
Rock outcrop.				
OdA, OdB: Odessa	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, thin layer.
OgB: Oquaga	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
[1]OlC:				
Oquaga	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
Lordstown	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
[1]ORC:				
Oquaga	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
Arnot	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: small stones, area reclaim.
Rock outcrop.				
[1]ORD:				
Oquaga	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, large stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
[1]ORD:				
Arnot	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: slope, large stones, area reclaim.
Rock outcrop.				
Pa Palms	Poor: wetness, excess humus.	Unsuited: excess humus, excess fines.	Unsuited: excess humus, excess fines.	Poor: wetness, excess humus.
Pb Palms bedrock Variant	Poor: excess humus, wetness.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.
PlB Plainfield	Good	Good	Unsuited: excess fines.	Fair: too sandy.
PlC Plainfield	Good	Good	Unsuited: excess fines.	Fair: too sandy, slope.
[1]PmD:				
Plainfield	Fair: slope.	Good	Unsuited: excess fines.	Poor: slope.
Riverhead	Fair: slope, frost action.	Good	Poor: excess fines.	Poor: slope.
[1]PmF:				
Plainfield	Poor: slope.	Good	Unsuited: excess fines.	Poor: slope.
Riverhead	Poor: slope.	Good	Poor: excess fines.	Poor: slope.
[1]PrC:				
Plainfield	Good	Good	Unsuited: excess fines.	Poor: too sandy, slope.
Rock outcrop.				
Pt Pompton	Fair: frost action.	Fair: excess fines.	Unsuited: excess fines.	Good.
Ra Raynham	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good:
Re Red Hook	Poor: frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
RhA, RhB Rhinebeck	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, thin layer.
RvA, RvB Riverhead	Fair: frost action.	Good	Fair: excess fines.	Good.
RvC Riverhead	Fair: frost action.	Good	Fair: excess fines.	Fair: slope.
[1]RXC:				
Rock outcrop.				
Arnot	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
[1]RXE:				
Rock outcrop.				
Arnot	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones, area reclaim.
[1]RXF:				
Rock outcrop.				
Arnot	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones, area reclaim.
SaB, SaC Schoharie	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Sc Scio	Poor: frost action.	Poor: excess fines.	Poor: excess fines.	Good.
[1]SdB:				
Scriba	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Morris	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
[1]SEB, [1]SGB:				
Scriba	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Morris	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
[1]SmB, [1]SmC:				
Stockbridge	Fair: frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
Farmington	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: thin layer, excess fines.	Poor: area reclaim, small stones.
[1]STD:				
Stockbridge	Fair: slope, frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Farmington	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: thin layer, excess fines.	Poor: slope, small stones.
Rock outcrop.				
Su Suncook	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
SwB, SwC Swartswood	Fair: frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
Te Teel	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Tg Tioga	Fair: frost action.	Unsuited: excess fines.	Poor: excess fines.	Good.
TkA, TkB, TkC Tunkhannock	Fair: frost action.	Fair: excess fines.	Good	Poor: small stones.
TuB, TuC Tunkhannock	Fair: thin layer, frost action.	Poor: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
TuD: Tunkhannock	Fair: slope, thin layer, frost action.	Poor: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: slope, small stones.
Un: Unadilla	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
[1]VAB: Valois	Fair: frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: large stones.
[1]VAD: Valois	Fair: slope, frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: large stones, slope.
VoA, VoB, VoC: Volusia	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, thin layer.
[1]VSB: Volusia	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Wa: Walpole	Fair: wetness, frost action.	Fair: excess fines.	Unsuited: excess fines.	Good.
Wb, Wc: Wayland	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
WeB, WeC: Wellsboro	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
[1]WLB, [1]WOB:				
Wellsboro	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Wurtsboro	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
WsA, WsB: Williamson	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
WuB: Wurtsboro	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 11.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
AA. Alluvial land						
AcB: Arnot	Depth to rock, seepage.	Thin layer, depth to rock.	Depth to rock	Not needed	Depth to rock, rooting depth.	Droughty, rooting depth
[1]ARD:						
Arnot	Depth to rock, slope, seepage.	Thin layer, depth to rock, large stones.	Depth to rock, large stones.	Not needed	Depth to rock, slope.	Droughty, rooting depth slope.
Lordstown	Depth to rock, slope.	Thin layer, large stones.	No water, large stones.	Not needed	Depth to rock, slope.	Droughty, slope.
Rock outcrop.						
[1]ARF:						
Arnot	Depth to rock, slope, seepage.	Thin layer, depth to rock, large stones.	Depth to rock, large stones.	Not needed	Depth to rock, slope, large stones.	Droughty, rooting depth slope.
Oquaga	Depth to rock, slope.	Thin layer, large stones.	No water, large stones.	Not needed	Depth to rock, slope.	Droughty, slope.
Rock outcrop.						
At: Atherton	Seepage	Piping, seepage.	Favorable	Wetness, poor outlets.	Not needed	Wetness.
Ba: Barbour	Seepage	Piping, seepage.	No water	Not needed	Not needed	Erodes easily, piping.
Be: Basher	Favorable	Piping, low strength.	Deep to water	Floods, wetness.	Not needed	Erodes easily, piping.
BgC, BgD: Bath	Slope	Favorable	No water	Not needed	Slope	Slope.
[1]BHE: Bath	Slope	Large stones	Large stones, no water.	Not needed	Large stones, slope.	Large stones, slope.
[1]BnC:						
Bath	Slope	Favorable	No water	Not needed	Slope	Slope.
Nassau	Slope, depth to rock, seepage.	Depth to rock, thin layer.	Depth to rock, no water.	Not needed	Slope, depth to rock, complex slope.	Slope, rooting depth droughty.
[1]BOD:						
Bath	Slope	Favorable	No water	Not needed	Slope	Slope.
Nassau	Slope, depth to rock, seepage.	Depth to rock, thin layer.	Depth to rock, no water.	Not needed	Depth to rock, droughty.	Slope, rooting depth droughty.
Rock outcrop.						
[1]BRC:						
Bath	Slope	Large stones	Large stones, no water.	Not needed	Slope, percs slowly.	Slope, percs slowly.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
[1]BRC:						
Mardin	Slope	Large stones	Deep to water, large stones.	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope.
CaB Cambridge	Slope	Favorable	Deep to water, slope.	Percs slowly, slope.	Erodes easily, percs slowly.	Percs slowly, erodes easily.
CaC Cambridge	Slope	Favorable	Deep to water, slope.	Percs slowly, slope.	Erodes easily, percs slowly.	Percs slowly, erodes easily.
Cc, Cd Canandaigua	Favorable	Piping, low strength.	Slow refill, cutbanks cave.	Poor outlets, cutbanks cave.	Not needed	Wetness.
Ce Carlisle	Seepage, excess humus.	Excess humus, hard to pack.	Subsides	Wetness, poor outlets.	Not needed	Not needed.
CgA, CgB Castile	Seepage	Seepage, thin layer.	Deep to water	Cutbanks cave	Piping, too sandy.	Favorable.
CkB, CkC Cayuga	Slope	Low strength	Deep to water	Percs slowly, slope.	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly, slope.
CnA, CnB, CnC Chenango	Seepage	Seepage, piping.	No water	Not needed	Complex slope, piping,	Droughty, slope.
CvA, CvB Churchville	Favorable	Low strength	Slow refill	Percs slowly	Percs slowly, erodes easily.	Percs slowly, erodes easily.
[1]FAE:						
Farmington	Slope, depth to rock, seepage.	Depth to rock, large stones, thin layer.	Depth to rock, no water, large stones.	Not needed	Slope, depth to rock.	Slope, rooting depth, droughty.
Rock outcrop.						
FW. Fresh water marsh						
Ha Hamlin	Favorable	Piping, low strength.	Deep to water, cutbanks cave.	Not needed	Not needed	Piping, erodes easily.
He Haven	Seepage	Seepage, piping.	No water	Not needed	Erodes easily	Erodes easily.
HfA, HgA, HgB, HgC, HgD, [1]HSF Hoosic	Seepage, slope.	Seepage, piping.	No water	Not needed	Complex slope, piping.	Droughty, slope.
HuB, HuC Hudson	Slope	Erodes easily, low strength, hard to pack.	Deep to water, slow refill.	Percs slowly, frost action, slope.	Slope, percs slowly, erodes easily.	Slope, percs slowly, erodes easily.
[1]HvC3, [1]HwD, [1]HXE:						
Hudson	Slope	Erodes easily, low strength, hard to pack.	Deep to water, slow refill.	Percs slowly, slope.	Slope, percs slowly, erodes easily.	Slope, percs slowly, erodes easily.
Schoharie	Slope	Low strength	Deep to water	Percs slowly, slope.	Slope, percs slowly, erodes easily.	Slope, percs slowly, erodes easily.
LaB, LaC Lackawanna	Slope	Favorable	No water	Not needed	Percs slowly, erodes easily, slope.	Percs slowly, erodes easily, slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
[1]LCD, [1]LCF, [1]LEE:						
Lackawanna	Slope	Large stones	No water	Not needed	Large stones, percs slowly, slope.	Large stones, percs slowly, slope.
Swartswood	Slope	Large stones	No water	Not needed	Large stones, percs slowly, slope.	Large stones, percs slowly, slope.
Lm Lamson	Seepage	Piping, unstable fill.	Favorable, cutbanks cave.	Wetness, poor outlets, piping.	Not needed	Wetness, piping.
LnB Lordstown	Depth to rock	Thin layer, depth to rock.	No water	Not needed	Depth to rock, rooting depth.	Droughty, rooting depth.
[1]LOC:						
Lordstown	Depth to rock, slope.	Thin layer, depth to rock.	No water	Not needed	Depth to rock, rooting depth, slope.	Droughty, slope, rooting depth.
Arnot	Depth to rock, slope, seepage.	Thin layer, depth to rock.	Depth to rock	Not needed	Depth to rock, slope, rooting depth.	Droughty, rooting depth, slope.
Rock outcrop.						
[1]LY:						
Lyons	Favorable	Large stones	Large stones	Wetness, percs slowly, poor outlets.	Not needed	Wetness, large stones.
Atherton	Seepage	Piping, seepage, large stones.	Large stones	Wetness, poor outlets.	Not needed	Wetness, large stones.
Ma Madalin	Favorable	Low strength	Slow refill	Wetness, percs slowly, poor outlets.	Not needed	Wetness, percs slowly.
MdB Mardin	Favorable	Favorable	Deep to water	Percs slowly, slope.	Percs slowly, rooting depth.	Percs slowly.
[1]MgB:						
Mardin	Favorable	Favorable	Deep to water	Percs slowly, slope.	Percs slowly, rooting depth.	Percs slowly, slope.
Nassau	Depth to rock, seepage.	Depth to rock, thin layer.	Depth to rock, no water.	Not needed	Depth to rock, droughty.	Slope, rooting depth, droughty.
Mn Menlo	Favorable	Favorable	Favorable	Wetness, percs slowly.	Not needed	Wetness, percs slowly.
MO Menlo	Favorable	Large stones	Large stones	Wetness, percs slowly, large stones.	Not needed	Large stones, wetness, percs slowly.
Mr Middlebury	Favorable	Piping, low strength.	Deep to water, cutbanks cave.	Floods, poor outlets.	Not needed	Erodes easily, piping.
[1]MTB:						
Morris	Favorable	Large stones	Large stones, slow refill.	Percs slowly, large stones.	Percs slowly, wetness, large stones.	Percs slowly, wetness, large stones.
Tuller	Depth to rock, seepage.	Thin layer, large stones, depth to rock.	Slow refill, large stones, depth to rock.	Depth to rock, wetness, large stones.	Depth to rock, large stones, rooting depth.	Rooting depth, large stones, wetness.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
[1]NBF:						
Nassau	Slope, depth to rock, seepage.	Depth to rock, thin layer.	Depth to rock, no water.	Not needed	Slope, depth to rock, droughty.	Slope, rooting depth, droughty.
Bath	Slope	Favorable	No water	Not needed	Slope, percs slowly, erodes easily.	Slope. percs slowly, erodes easily.
Rock outcrop.						
[1]NMC, [1]NNF:						
Nassau	Slope, depth to rock, seepage.	Depth to rock, thin layer.	Depth to rock, no water.	Not needed	Slope, depth to rock, droughty.	Slope, rooting depth, droughty.
Manlius	Depth to rock	Thin layer, piping, depth to rock.	No water	Not needed	Depth to rock, slope.	Droughty, slope, rooting depth.
[1]NOD:						
Nassau	Slope, depth to rock, seepage.	Depth to rock, thin layer.	Depth to rock, no water.	Not needed	Slope, depth to rock, droughty.	Slope, rooting depth, droughty.
Rock outcrop.						
OdA, OdB: Odessa	Favorable	Low strength	Slow refill	Percs slowly	Wetness, erodes easily.	Wetness, erodes easily.
OgB: Oquaga	Depth to rock	Thin layer, depth to rock.	No water	Not needed	Depth to rock, rooting depth.	Droughty, rooting depth.
[1]OlC:						
Oquaga	Depth to rock, slope.	Thin layer, depth to rock.	No water	Not needed	Depth to rock, slope, rooting depth.	Droughty, rooting depth, slope.
Lordstown	Depth to rock, slope.	Thin layer, depth to rock.	No water	Not needed	Depth to rock, rooting depth, slope.	Droughty, slope, rooting depth.
[1]ORC, [1]ORD:						
Oquaga	Depth to rock, slope.	Thin layer, depth to rock.	No water	Not needed	Depth to rock, slope, rooting depth.	Droughty, rooting depth, slope.
Arnot	Depth to rock, slope, seepage.	Depth to rock	Depth to rock	Not needed	Depth to rock, slope, rooting depth.	Droughty, rooting depth, slope.
Rock outcrop.						
Pa: Palms	Seepage, excess humus.	Low strength, unstable fill.	Subsides	Wetness, poor outlets.	Not needed	Wetness.
Pb: Palms bedrock Variant	Depth to rock, seepage, excess humus.	Seepage, hard to pack, unstable fill.	Depth to rock	Depth to rock, wetness, poor outlets.	Not needed	Not needed.
PlB: Plainfield	Seepage	Seepage	No water	Not needed	Too sandy, soil blowing.	Droughty, rooting depth.
PlC: Plainfield	Seepage, slope.	Seepage	No water	Not needed	Too sandy, soil blowing.	Droughty, slope.
[1]PmD, [1]PmF:						
Plainfield	Seepage, slope.	Seepage	No water	Not needed	Slope, too sandy, soil blowing.	Droughty, slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
[1]PmD, [1]PmF:						
Riverhead	Seepage, slope.	Seepage, piping.	No water	Not needed	Piping, slope.	Slope, droughty.
[1]PrC:						
Plainfield	Seepage, slope.	Seepage	No water	Not needed	Slope, too sandy, soil blowing.	Droughty, slope.
Rock outcrop.						
Pt: Pompton	Seepage	Seepage, piping.	Deep to water	Cutbanks cave	Piping, erodes easily.	Erodes easily.
Ra: Raynham	Favorable	Piping, low strength, erodes easily.	Cutbanks cave	Percs slowly, cutbanks cave.	Wetness, percs slowly, erodes easily.	Wetness, percs slowly, erodes easily.
Re: Red Hook	Seepage	Thin layer	Favorable	Wetness	Wetness	Wetness.
RhA, RhB: Rhinebeck	Favorable	Low strength, erodes easily.	Slow refill	Percs slowly	Wetness, erodes easily.	Wetness, erodes easily.
RvA, RvB, RvC: Riverhead	Seepage, slope.	Seepage, piping.	No water	Not needed	Piping, slope.	Slope, droughty.
[1]RXC, [1]RXE, [1]RXF:						
Rock outcrop.						
Arnot	Depth to rock, slope, seepage.	Thin layer, depth to rock.	Depth to rock, no water.	Not needed	Depth to rock, slope.	Droughty, rooting depth, slope.
SaB, SaC: Schoharie	Slope	Low strength	Deep to water	Percs slowly	Slope, percs slowly, erodes easily.	Slope, percs slowly, erodes easily.
Sc: Scio	Seepage	Low strength, piping.	Cutbanks cave, deep to water.	Favorable	Erodes easily	Erodes easily.
[1]SdB:						
Scriba	Favorable	Favorable	Slow refill	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
Morris	Favorable	Favorable	Slow refill	Percs slowly	Percs slowly, wetness.	Percs slowly, wetness.
[1]SEB, [1]SGB:						
Scriba	Favorable	Large stones	Large stones, slow refill.	Percs slowly, large stones.	Wetness, large stones, percs slowly.	Wetness, large stones, percs slowly.
Morris	Favorable	Large stones	Large stones, slow refill.	Percs slowly, large stones.	Percs slowly, wetness, large stones.	Percs slowly, wetness, large stones.
[1]SmB, [1]SmC:						
Stockbridge	Seepage	Seepage	No water	Not needed	Slope	Slope.
Farmington	Depth to rock, seepage.	Depth to rock, thin layer.	Depth to rock, no water.	Not needed	Slope, depth to rock, rooting depth.	Slope, rooting depth, droughty.
[1]STD:						
Stockbridge	Seepage, slope.	Seepage	No water	Not needed	Complex slope	Slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
[1]STD:						
Farmington	Slope, depth to rock, seepage.	Depth to rock, thin layer.	Depth to rock, no water.	Not needed	Complex slope, depth to rock, rooting depth.	Slope, rooting depth, droughty.
Rock outcrop.						
Su: Suncook	Seepage	Seepage, erodes easily.	Deep to water	Not needed	Not needed	Erodes easily, piping.
SwB, SwC: Swartswood	Slope	Favorable	No water	Not needed	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Te: Teel	Favorable	Piping, low strength.	Deep to water, cutbanks cave.	Floods, wetness, poor outlets.	Not needed	Piping, erodes easily.
Tg: Tioga	Seepage	Piping, low strength, seepage.	Deep to water	Not needed	Not needed	Erodes easily, piping.
TkA, TkB, TkC: Tunkhannock	Seepage	Seepage, piping.	No water	Not needed	Complex slope, piping.	Droughty, slope.
TuB, TuC, TuD: Tunkhannock	Seepage, slope.	Seepage, piping.	No water	Not needed	Piping, slope.	Droughty, slope.
Un: Unadilla	Seepage	Low strength, piping, seepage.	No water	Not needed	Not needed	Erodes easily.
[1]VAB, [1]VAD: Valois	Seepage, slope.	Seepage, large stones.	Deep to water, large stones.	Not needed	Large stones, slope.	Large stones, slope.
VoA, VoB, VoC: Volusia	Favorable	Favorable	Slow refill	Percs slowly	Wetness, percs slowly, rooting depth.	Wetness, percs slowly, slope.
[1]VSB: Volusia	Favorable	Large stones	Large stones, slow refill.	Percs slowly, large stones.	Wetness, large stones, rooting depth.	Wetness, large stones, rooting depth.
Wa: Walpole	Seepage	Piping, seepage.	Cutbanks cave	Cutbanks cave	Wetness, piping.	Wetness, erodes easily.
Wb, Wc: Wayland	Favorable	Piping, low strength.	Favorable, cutbanks cave.	Wetness, floods, poor outlets.	Not needed	Wetness, erodes easily.
WeB, WeC: Wellsboro	Slope	Favorable	Deep to water	Percs slowly, slope.	Percs slowly, rooting depth.	Percs slowly, slope.
[1]WLB, [1]WOB:						
Wellsboro	Favorable	Large stones	Deep to water, large stones.	Percs slowly, large stones,	Percs slowly, large stones, rooting depth.	Percs slowly, rooting depth, large stones.
Wurtsboro	Favorable	Large stones	Deep to water, large stones.	Percs slowly, large stones.	Percs slowly, large stones, rooting depth.	Percs slowly, rooting depth, large stones.
WsA, WsB: Williamson	Favorable	Piping, low strength.	Deep to water	Percs slowly	Percs slowly, erodes easily.	Percs slowly, erodes easily.
WuB: Wurtsboro	Favorable	Favorable	Deep to water	Percs slowly	Percs slowly, rooting depth.	Percs slowly, rooting depth.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 12.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AA. Alluvial land					
AcB: Arnot	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock, small stones.	Moderate: small stones.	Severe: depth to rock.
[1]ARD:					
Arnot	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Moderate: slope, small stones.	Severe: slope, depth to rock.
Lordstown	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope.
Rock outcrop.					
[1]ARF:					
Arnot	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, depth to rock.
Oquaga	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop.					
At: Atherton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ba: Barbour	Moderate: floods.	Moderate: floods.	Moderate: floods,	Slight	Moderate: floods.
Be: Basher	Moderate: floods.	Moderate: floods.	Moderate: floods, wetness.	Slight	Moderate: floods.
BgC: Bath	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Moderate: slope, small stones.
BgD: Bath	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope.
[1]BHE: Bath	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
[1]BnC:					
Bath	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope.
Nassau	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope, depth to rock.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
[1]BOD:					
Bath	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope.
Nassau	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope, small stones.	Severe: slope, depth to rock.
Rock outcrop.					
[1]BRC:					
Bath	Moderate: slope, large stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.	Moderate: slope, large stones.
Mardin	Moderate: slope, large stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.	Moderate: large stones.
CaB Cambridge	Moderate: percs slowly.	Slight	Moderate: small stones, wetness, percs slowly.	Slight	Slight.
CaC Cambridge	Moderate: slope, percs slowly.	Moderate: slope, wetness.	Severe: slope.	Slight	Moderate: slope.
Cc, Cd Canandaigua	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ce Carlisle	Severe: floods, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, floods.	Severe: wetness, excess humus.	Severe: excess humus, wetness, floods.
CgA, CgB Castile	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: small stones.
CkB Cayuga	Moderate: percs slowly.	Slight	Moderate: slope, wetness, percs slowly.	Slight	Slight.
CkC Cayuga	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CnA, CnB Chenango	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: small stones.
CnC Chenango	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Moderate: slope, small stones.
CvA Churchville	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
CvB Churchville	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: slope, wetness.	Moderate: wetness.	Moderate: wetness.
[1]FAE:					
Farmington	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Rock outcrop.					

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FW. Fresh water marsh					
Ha-------------------- Hamlin	Moderate: floods.	Moderate: floods.	Moderate: floods.	Slight------------	Slight.
He-------------------- Haven	Slight----------	Slight----------	Slight----------	Slight------------	Slight.
HfA, HgA, HgB--------- Hoosic	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
HgC------------------- Hoosic	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.
HgD------------------- Hoosic	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones, slope.	Severe: slope, small stones.
[1]HSF------------------ Hoosic	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
HuB------------------- Hudson	Moderate: percs slowly.	Slight----------	Moderate: percs slowly, slope.	Slight------------	Moderate: too clayey.
HuC------------------- Hudson	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight------------	Moderate: slope, too clayey.
[1]HvC3:					
Hudson---------------	Moderate: slope, percs slowly, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: slope, too clayey.
Schoharie------------	Moderate: percs slowly, slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: too clayey.
[1]HwD:					
Hudson---------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.
Schoharie------------	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.
[1]HXE:					
Hudson---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Schoharie------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LaB------------------- Lackawanna	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Slight.
LaC------------------- Lackawanna	Moderate: slope, percs slowly, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Moderate: slope.
[1]LCD, [1]LCF:					
Lackawanna-----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, large stones.	Severe: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
[1]LCD, [1]LCF:					
Swartswood	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, large stones.	Severe: slope.
[1]LEE:					
Lackawanna	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Swartswood	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope, large stones.	Severe: slope, large stones.
Lm: Lamson	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
LnB: Lordstown	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: depth to rock, small stones.
[1]LOC:					
Lordstown	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Moderate: slope, depth to rock, small stones.
Arnot	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, depth to rock, small stones.	Moderate: small stones.	Severe: depth to rock.
Rock outcrop.					
[1]LY:					
Lyons	Severe: wetness.	Severe: wetness.	Severe: wetness, small stones.	Severe: wetness.	Severe: wetness.
Atherton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, large stones.
Ma: Madalin	Severe: wetness.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
MdB: Mardin	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: small stones.
[1]MgB:					
Mardin	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: small stones.
Nassau	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock, small stones.	Moderate: small stones.	Severe: depth to rock.
Mn, MO: Menlo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Mr: Middlebury	Moderate: floods.	Moderate: floods.	Moderate: floods, wetness.	Slight	Slight.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
[1]MTB:					
Morris	Moderate: percs slowly, wetness, large stones.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness, large stones.	Severe: wetness.
Tuller	Severe: wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Severe: depth to rock, wetness, large stones.
[1]NBF:					
Nassau	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Bath	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop.					
[1]NMC:					
Nassau	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, depth to rock.	Moderate: small stones.	Severe: depth to rock.
Manlius	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: small stones, slope.	Moderate: small stones.	Moderate: slope, depth to rock, small stones.
[1]NNF:					
Nassau	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Manlius	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope.
[1]NOD:					
Nassau	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope, small stones.	Severe: slope, depth to rock.
Rock outcrop.					
OdA, OdB Odessa	Severe: percs slowly.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.	Moderate: wetness.
OgB Oquaga	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: depth to rock.
[1]OlC:					
Oquaga	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Moderate: slope, depth to rock.
Lordstown	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Moderate: slope, depth to rock, small stones.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
[1]ORC:					
Oquaga	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Moderate: slope, depth to rock.
Arnot	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, depth to rock, small stones.	Moderate: small stones.	Severe: depth to rock.
Rock outcrop.					
[1]ORD:					
Oquaga	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope.
Arnot	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Moderate: slope, small stones.	Severe: slope, depth to rock.
Rock outcrop.					
Pa Palms	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.	Severe: wetness, floods, excess humus.
Pb Palms bedrock Variant	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness.
PlB Plainfield	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: too sandy.
PlC Plainfield	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: too sandy, slope.
[1]PmD:					
Plainfield	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too sandy.	Severe: slope.
Riverhead	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
[1]PmF:					
Plainfield	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Riverhead	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]PrC:					
Plainfield	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: too sandy, slope.
Rock outcrop.					
Pt Pompton	Slight	Slight	Moderate: wetness.	Slight	Moderate: wetness.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ra Raynham	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Re Red Hook		Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, small stones.
RhA, RhB Rhinebeck	Moderate: wetness, percs slowly.	Moderate: wetness, small stones.	Severe: wetness, small stones.	Moderate: wetness.	Moderate: wetness.
RvA Riverhead	Slight	Slight	Slight	Slight	Slight.
RvB Riverhead	Slight	Slight	Moderate: slope.	Slight	Slight.
RvC Riverhead	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
[1]RXC: Rock outcrop.					
Arnot	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, depth to rock, small stones.	Moderate: small stones.	Severe: depth to rock.
[1]RXE, [1]RXF: Rock outcrop.					
Arnot	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
SaB Schoharie	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight	Moderate: too clayey.
SaC Schoharie	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: too clayey.
Sc Scio	Slight	Slight	Moderate: wetness.	Slight	Slight.
[1]SdB: Scriba	Moderate: wetness, small stones.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness, small stones.	Moderate: wetness.
Morris	Moderate: wetness, small stones.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness, small stones.	Moderate: wetness.
[1]SEB: Scriba	Moderate: wetness, large stones.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness, large stones.	Moderate: wetness.
Morris	Moderate: wetness, large stones.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness, large stones.	Severe: wetness.
[1]SGB: Scriba	Severe: large stones.	Moderate: wetness, large stones.	Severe: large stones, wetness.	Severe: large stones, wetness.	Severe: large stones.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
[1]SGB:					
Morris	Severe: large stones.	Moderate: large stones, wetness.	Severe: large stones, wetness.	Severe: large stones, wetness.	Severe: large stones.
[1]SmB:					
Stockbridge	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Slight.
Farmington	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock.	Moderate: small stones.	Severe: depth to rock.
[1]SmC:					
Stockbridge	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Moderate: slope.
Farmington	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, depth to rock.	Moderate: small stones.	Severe: depth to rock.
[1]STD:					
Stockbridge	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope.
Farmington	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope, small stones.	Severe: slope, depth to rock.
Rock outcrop.					
Su Suncook	Moderate: too sandy, floods.	Moderate: too sandy, floods.	Moderate: too sandy, floods.	Moderate: too sandy.	Moderate: too sandy.
SwB Swartswood	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
SwC Swartswood	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Moderate: slope, small stones.
Te Teel	Moderate: floods.	Moderate: floods.	Moderate: floods.	Slight	Slight.
Tg Tioga	Moderate: floods.	Moderate: floods.	Moderate: floods.	Slight	Slight.
TkA, TkB Tunkhannock	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: small stones.
TkC Tunkhannock	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: small stones.	Moderate: small stones.
TuB Tunkhannock	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: small stones.
TuC Tunkhannock	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Moderate: slope, small stones.
TuD Tunkhannock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Un------ Unadilla	Slight------	Slight------	Slight------	Slight------	Slight.
[1]VAB------ Valois	Moderate: large stones.	Moderate: small stones.	Severe: small stones.	Moderate: large stones.	Moderate: large stones.
[1]VAD------ Valois	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: large stones.	Severe: slope.
VoA, VoB------ Volusia	Moderate: wetness, small stones.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness, small stones.	Moderate: small stones, wetness.
VoC------ Volusia	Moderate: slope, wetness.	Moderate: slope, wetness, small stones.	Severe: slope, small stones, wetness.	Moderate: wetness, small stones.	Moderate: slope, small stones, wetness.
[1]VSB------ Volusia	Moderate: wetness, large stones.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness, large stones.	Moderate: wetness, large stones.
Wa------ Walpole	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: wetness.
Wb, Wc------ Wayland	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
WeB------ Wellsboro	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Slight.
WeC------ Wellsboro	Moderate: small stones, slope.	Moderate: slope, small stones.	Severe: small stones, slope.	Moderate: small stones.	Moderate: slope.
[1]WLB:					
Wellsboro------	Moderate: large stones.	Moderate: small stones.	Severe: small stones.	Moderate: large stones.	Moderate: large stones.
Wurtsboro------	Moderate: large stones.	Moderate: small stones.	Severe: small stones.	Moderate: large stones.	Moderate: large stones.
[1]WOB:					
Wellsboro------	Severe: large stones.	Moderate: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.
Wurtsboro------	Severe: large stones.	Moderate: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.
WsA, WsB------ Williamson	Moderate: percs slowly.	Slight------	Moderate: percs slowly.	Slight------	Slight.
WuB------ Wurtsboro	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Slight.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 13.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Areas of Rock outcrop, Alluvial land, and Fresh water marsh are too variable to be rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AA. Alluvial land										
AcB: Arnot	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
[1]ARD:										
Arnot	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Lordstown	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Rock outcrop.										
[1]ARF:										
Arnot	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Oquaga	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
At: Atherton	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Ba: Barbour	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Be: Basher	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
BgC: Bath	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
BgD: Bath	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
[1]BHE: Bath	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
[1]BnC:										
Bath	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Nassau	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
[1]BOD:										
Bath	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Nassau	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Rock outcrop.										
[1]BRC:										
Bath	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
[1]BRC:										
Mardin	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
CaB Cambridge	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CaC Cambridge	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Cc, Cd Canandaigua	Very poor	Poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good
Ce Carlisle	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
CgA Castile	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
CgB Castile	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CkB Cayuga	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CkC Cayuga	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
CnA, CnB, CnC Chenango	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
CvA Churchville	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
CvB Churchville	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
[1]FAE:										
Farmington	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Rock outcrop.										
FW. Fresh water marsh										
Ha Hamlin	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
He Haven	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
HfA, HgA, HgB, HgC, HgD Hoosic	Poor	Fair	Fair	Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor
[1]HSF Hoosic	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
HuB Hudson	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
HuC Hudson	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
[1]HvC3:										
Hudson	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Schoharie	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
[1]HwD:										
Hudson	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Schoharie	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
[1]HXE:										
Hudson	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Schoharie	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
LaB: Lackawanna	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
LaC: Lackawanna	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
[1]LCD:										
Lackawanna	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Swartswood	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
[1]LCF:										
Lackawanna	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Swartswood	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
[1]LEE:										
Lackawanna	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Swartswood	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Lm: Lamson	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
LnB: Lordstown	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
[1]LOC:										
Lordstown	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Arnot	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Rock outcrop.										
[1]LY:										
Lyons	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
[1]LY:										
Atherton	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Ma: Madalin	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
MdB: Mardin	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
[1]MgB:										
Mardin	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
Nassau	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Mn: Menlo	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
MO: Menlo	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Mr: Middlebury	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
[1]MTB:										
Morris	Very poor	Poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
Tuller	Very poor	Poor	Poor	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
[1]NBF:										
Nassau	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Bath	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Rock outcrop.										
[1]NMC:										
Nassau	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Manlius	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
[1]NNF:										
Nassau	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Manlius	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
[1]NOD:										
Nassau	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Rock outcrop.										
OdA: Odessa	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
OdB: Odessa	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
OgB------ Oquaga	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
[1]OlC:										
Oquaga------	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
Lordstown------	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
[1]ORC:										
Oquaga------	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
Arnot------	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Rock outcrop.										
[1]ORD:										
Oquaga------	Very poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Arnot------	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Rock outcrop.										
Pa------ Palms	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Pb------ Palms bedrock Variant	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
PlB------ Plainfield	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
PlC------ Plainfield	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
[1]PmD:										
Plainfield------	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Riverhead------	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
[1]PmF:										
Plainfield------	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Riverhead------	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
[1]PrC:										
Plainfield------	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Rock outcrop.										
Pt------ Pompton	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Ra------ Raynham	Poor	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Re----------------- Red Hook	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
RhA---------------- Rhinebeck	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
RhB---------------- Rhinebeck	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
RvA---------------- Riverhead	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
RvB, RvC----------- Riverhead	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
[1]RXC: Rock outcrop.										
Arnot-------------	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
[1]RXE, [1]RXF: Rock outcrop.										
Arnot-------------	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
SaB---------------- Schoharie	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
SaC---------------- Schoharie	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Sc----------------- Scio	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
[1]SdB:										
Scriba------------	Fair	Fair	Fair	Poor	Poor	Poor	Very poor	Fair	Poor	Very poor
Morris------------	Fair	Fair	Fair	Poor	Poor	Poor	Very poor	Fair	Poor	Very poor
[1]SEB:										
Scriba------------	Very poor	Poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
Morris------------	Very poor	Poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
[1]SGB:										
Scriba------------	Very poor	Very poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
Morris------------	Very poor	Very poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
[1]SmB:										
Stockbridge-------	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Farmington--------	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
[1]SmC:										
Stockbridge	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Farmington	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
[1]STD:										
Stockbridge	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Farmington	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Rock outcrop.										
Su: Suncook	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
SwB: Swartswood	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
SwC: Swartswood	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Te: Teel	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Tg: Tioga	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
TkA, TkB, TkC, TuB, TuC: Tunkhannock	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
TuD: Tunkhannock	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Un: Unadilla	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
[1]VAB: Valois	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
[1]VAD: Valois	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
VoA: Volusia	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Fair	Poor	Fair
VoB: Volusia	Fair	Fair	Fair	Poor	Poor	Poor	Very poor	Fair	Poor	Very poor
VoC: Volusia	Fair	Fair	Fair	Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor
[1]VSB: Volusia	Very poor	Poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
Wa: Walpole	Poor	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair
Wb, Wc: Wayland	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
WeB: Wellsboro	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
WeC: Wellsboro	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
[1]WLB:										
Wellsboro	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Wurtsboro	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
[1]WOB:										
Wellsboro	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Wurtsboro	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
WsA: Williamson	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
WsB: Williamson	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
WuB: Wurtsboro	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AA. Alluvial land											
AcB----------------- Arnot	0-7	Channery silt loam.	ML, GM, SM	A-2, A-4	5-10	60-85	55-80	45-80	30-70	<30	NP-5
	7-17	Very channery silt loam, very channery loam.	GM, GM-GC	A-2, A-4, A-1	10-25	30-60	25-55	20-55	15-50	<30	NP-5
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]ARD: Arnot-------------	0-2	Very bouldery silt loam, very bouldery loam.	ML, GM, SM	A-2, A-4	10-20	60-85	55-80	45-80	30-70	<30	NP-5
	2-14	Very channery silt loam, very channery loam.	GM, GM-GC	A-2, A-4, A-1	10-25	30-60	25-55	20-55	15-50	<30	NP-5
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lordstown---------	0-4	Very bouldery silt loam, very bouldery loam.	ML, GM	A-4	10-20	65-85	50-75	50-75	40-65	<30	NP-4
	4-32	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
[1]ARF: Arnot-------------	0-3	Very bouldery silt loam.	ML, GM, SM	A-2, A-4	10-20	60-85	55-80	45-80	30-70	<30	NP-5
	3-14	Very channery silt loam, very channery loam.	GM, GM-GC	A-2, A-4, A-1	10-25	30-60	25-55	20-55	15-50	<30	NP-5
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Oquaga------------	0-5	Very bouldery silt loam.	ML, GM	A-4, A-2	5-20	50-85	40-70	35-70	25-65	<25	NP-5
	5-26	Very channery loam, very channery silt loam, channery silt loam.	GM, ML	A-1, A-2, A-4	10-25	35-70	25-60	20-60	15-55	<25	NP-5
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
At----------------- Atherton	0-7	Silt loam-------	ML, OL, CL	A-4, A-7, A-5, A-6	0-5	95-100	90-100	75-95	55-85	25-50	5-20
	7-28	Silt loam, silty clay loam, gravelly loam.	GM-GC, CL, ML, CL-ML	A-4, A-6	0-5	65-95	60-95	50-90	40-80	25-40	5-20
	28-65	Stratified sand and gravel to silty clay.	GM, GM-GC, CL-ML, ML, GC	A-1, A-2, A-4	0-5	50-80	45-75	25-70	20-60	5-15	NP-5

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ba----------------- Barbour	0-6	Loam------------	ML, CL-ML, SM, SM-SC	A-4, A-2	0	80-100	75-100	50-95	30-90	15-25	2-7
	6-28	Silt loam, sandy loam, gravelly loam.	ML, SM, CL-ML, SM-SC	A-4, A-2, A-1	0	50-100	45-95	25-95	15-85	15-25	2-7
	28-50	Very gravelly sand, gravelly loamy fine sand.	SM, SP, GM, GP	A-1, A-2, A-3	0-15	35-95	30-95	20-80	2-40	---	NP
Be----------------- Basher	0-9	Silt loam-------	ML, CL-ML, SM, SM-SC	A-4	0-5	90-100	85-100	60-95	40-90	15-25	2-7
	9-27	Silt loam, loam, gravelly fine sandy loam.	SM, ML, CL, SM, SM-SC	A-4, A-2	0-5	75-100	70-95	50-95	30-85	15-25	2-7
	27-52	Silt loam, gravelly loam, fine sandy loam.	SM, ML, CL-ML, SM-SC	A-4, A-2	0-5	75-100	70-95	50-95	30-85	15-25	2-7
BgC, BgD----------- Bath	0-6	Gravelly silt loam.	ML, GM, SM, OL	A-2, A-4	5-10	60-95	50-95	40-85	30-80	30-40	5-10
	6-28	Channery loam, gravelly silt loam.	SM, GM, ML	A-2, A-4	5-10	65-95	50-90	40-85	20-80	20-35	NP-7
	28-55	Channery silt loam, very gravelly sandy loam.	GM, SM, GM-GC, ML	A-1, A-2, A-4	10-15	40-90	30-85	30-85	20-75	20-25	3-6
	55-65	Flaggy sandy loam, gravelly silt loam, very channery loam.	GM-GC, CL-ML, GM, SM	A-1, A-2, A-4	10-15	40-90	25-85	20-80	10-75	<25	NP-6
[1]BHE--------------- Bath	0-4	Very stony silt loam, very stony loam.	ML, GM, SM, OL	A-2, A-4	10-15	60-95	50-90	40-85	30-80	30-40	5-10
	4-26	Channery loam, very channery silt loam, gravelly loam.	SM, GM, ML	A-2, A-4	5-10	65-95	50-90	40-85	20-80	20-35	NP-7
	26-50	Channery loam, very channery silt loam, gravelly sandy loam.	SM, GM-GC, ML, GM	A-1, A-2, A-4	10-15	40-90	30-85	30-85	20-75	20-25	3-6
	50-60	Flaggy loam, gravelly silt loam, very channery sandy loam.	GM-GC, CL-ML, GM, SM	A-1, A-2, A-4	10-15	40-90	25-85	20-80	10-75	<25	NP-6

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
[1]BnC:											
Bath	0-6	Gravelly silt loam.	ML, GM, SM, OL	A-2, A-4	5-10	60-95	50-95	40-85	30-80	30-40	5-10
	6-28	Channery loam, gravelly silt loam.	SM, GM, ML	A-2, A-4	5-10	65-95	50-90	40-85	20-80	20-35	NP-7
	28-48	Gravelly sandy loam, very channery silt loam.	GM, SM, GM-GC, ML	A-1, A-2, A-4	10-15	40-90	30-85	30-85	20-75	20-25	3-6
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Nassau	0-6	Shaly silt loam	ML, GM	A-2, A-4	5-20	50-85	45-80	40-75	25-70	10-20	1-6
	6-16	Very shaly silt loam, very shaly loam.	GM	A-2, A-4	10-25	45-70	25-55	20-55	15-50	10-20	1-6
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]BOD:											
Bath	0-6	Gravelly silt loam.	ML, GM, SM, OL	A-2, A-4	5-10	60-95	50-95	40-85	30-80	30-40	5-10
	6-28	Channery loam, gravelly silt loam.	SM, GM, ML	A-2, A-4	5-10	65-95	50-90	40-85	20-80	20-35	NP-7
	28-48	Very gravelly sandy loam, channery silt loam.	GM, SM, GM-GC, ML	A-1, A-2, A-4	10-15	40-90	30-85	30-85	20-75	20-25	3-6
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Nassau	0-6	Shaly silt loam	ML, GM	A-2, A-4	5-20	50-85	45-80	40-75	25-70	10-20	1-6
	6-16	Very shaly silt loam, very shaly loam.	GM	A-2, A-4	10-25	45-70	25-55	20-55	15-50	10-20	1-6
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
[1]BRC:											
Bath	0-5	Very stony silt loam.	ML, GM, SM, OL	A-2, A-4	10-15	60-95	50-90	40-85	30-80	30-40	5-10
	5-28	Channery loam, channery silt loam, gravelly loam.	SM, GM, ML	A-2, A-4	5-10	65-95	50-90	40-85	20-80	20-35	NP-7
	28-55	Channery loam, very channery silt loam, gravelly sandy loam.	SM, GM-GC, ML, GM	A-1, A-2, A-4	10-15	40-90	30-85	30-85	20-75	20-25	3-6
	55-65	Flaggy loam, gravelly silt loam, very channery sandy loam.	GM-GC, CL-ML, GM, SM	A-1, A-2, A-4	10-15	40-90	25-85	20-80	10-75	<25	NP-6

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
[1]BRC:											
Mardin	0-6	Very stony silt loam.	GM, ML, CL, GC	A-4	5-15	65-75	60-70	50-70	35-60	25-35	5-10
	6-21	Channery silt loam, channery loam, gravelly loam.	CL, GC, SC, CL-ML	A-4	5-10	60-75	55-70	45-70	35-65	15-25	5-10
	21-46	Gravelly loam, channery silt loam, very channery loam.	CL, GC, SC, CL-ML	A-2, A-4	10-25	55-75	50-70	40-70	30-65	20-30	5-10
	46-56	Gravelly loam, channery silt loam, very channery silt loam.	CL, GC, SC, CL-ML	A-2, A-4	10-25	55-75	50-70	40-70	30-65	20-30	5-10
CaB, CaC: Cambridge	0-6	Gravelly silt loam.	ML, CL-ML, CL	A-4, A-6	0-5	90-100	85-100	75-100	65-90	25-40	4-13
	6-64	Silt loam, gravelly loam, silty clay loam, gravelly clay loam.	CL, SC, SM-SC, CL-ML	A-4, A-6	0-5	70-95	60-90	55-85	45-75	20-35	5-14
Cc: Canandaigua	0-9	Silt loam	ML, OL, MH, OH	A-4, A-5, A-6, A-7	0	95-100	95-100	90-100	85-100	35-55	5-15
	9-37	Silt loam, very fine sandy loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	70-95	20-40	5-15
	37-60	Silt loam, very fine sandy loam.	ML, CL	A-4	0	95-100	95-100	90-100	70-95	20-30	3-10
Cd: Canandaigua	0-9	Silt loam	ML, OL, MH, OH	A-4, A-5, A-6, A-7	0	95-100	95-100	90-100	85-100	35-55	5-15
	9-37	Silt loam, silty clay loam, very fine sandy loam.	ML, CL-ML, CL	A-4, A-7	0	95-100	95-100	90-100	70-95	20-40	5-15
	37-40	Silt loam, very fine sandy loam.	ML, CL	A-4	0	95-100	95-100	90-100	70-95	20-30	3-10
	40-60	Gravelly loam, gravelly silt loam.	SC, CL, CL-ML, GM	A-4	0-5	65-80	60-75	50-75	35-70	20-30	5-10
Ce: Carlisle	0-61	Sapric material	PT	A-8	---	---	---	---	---	---	---
CgA, CgB: Castile	0-8	Gravelly silt loam.	ML, GM	A-2, A-4	0-5	55-80	50-75	40-75	30-65	<30	NP-10
	8-28	Very gravelly loam, very gravelly sandy loam, gravelly silt loam.	GM, SM, ML	A-1, A-2, A-4	5-10	40-75	35-70	20-65	10-60	<30	NP-10
	28-50	Stratified sand and gravel to very gravelly loamy sand.	GW, GP, GW-GM	A-1	5-10	30-55	25-50	15-35	0-10	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
CkB, CkC----------- Cayuga	0-8	Silt loam-------	ML, CL-ML	A-4	0-5	95-100	90-100	85-95	65-90	15-30	4-10
	8-29	Silty clay, clay loam.	CL, CL-ML	A-6, A-4	0-5	95-100	85-100	80-100	70-95	20-35	5-15
	29-50	Loam, gravelly fine sandy loam, silty clay loam.	ML, SM, GM, CL	A-2, A-4	0-5	55-90	40-90	30-90	20-85	5-20	2-4
CnA, CnB, CnC------ Chenango	0-9	Gravelly silt loam.	ML, SM, GM	A-2, A-4, A-1	5-10	55-85	55-80	35-80	15-70	<40	NP-10
	9-35	Gravelly silt loam, gravelly loam, very gravelly fine sandy loam.	ML, GM, SM	A-2, A-4, A-1	5-10	35-80	30-75	25-75	15-65	<35	NP-10
	35-80	Very gravelly loamy coarse sand, very gravelly sand.	GW, GM, GW-GM, GP	A-1	5-10	25-65	20-60	10-50	1-20	---	NP
CvA, CvB----------- Churchville	0-10	Silt loam-------	ML, CL, MH, OL	A-7	0	95-100	90-100	80-100	75-90	40-55	15-25
	10-34	Silty clay loam, silty clay, clay loam.	CL	A-7	0	95-100	95-100	90-100	75-95	40-50	25-35
	34-54	Gravelly loam, silt loam, silty clay loam.	ML, GM, CL, GC	A-2, A-4	0-5	60-90	55-85	45-80	30-75	10-20	1-8
[1]FAE: Farmington--------	0-3	Very stony silt loam.	ML, CL, GM, GM-GC	A-4, A-6	5-15	55-80	50-75	35-70	45-65	20-35	3-15
	3-12	Silt loam, loam, gravelly fine sandy loam.	ML, CL, GM, GM-GC	A-2, A-4, A-6, A-1	0-5	60-95	55-90	35-85	20-80	20-35	3-15
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
FW. Fresh water marsh											
Ha----------------- Hamlin	0-8	Silt loam-------	ML, CL-ML, CL	A-4, A-6	0	100	95-100	90-100	60-90	15-35	2-15
	8-38	Silt loam, very fine sandy loam.	ML, CL-ML, CL	A-4, A-6	0	100	95-100	90-100	60-90	15-35	2-15
	38-58	Silt loam, very fine sandy loam, fine sandy loam.	ML, SM, CL, SM-SC	A-4, A-6	0	90-100	90-100	75-100	45-90	<25	NP-15
He----------------- Haven	0-11	Loam------------	ML	A-4	0	90-100	90-100	85-95	70-90	20-25	1-4
	11-25	Gravelly loam, silt loam, gravelly very fine sandy loam.	ML, SM, ML-CL	A-4, A-2	0	85-95	70-90	50-80	30-65	20-25	1-5
	25-60	Stratified sand and gravel, very gravelly sand.	SP, SW, GP	A-1	0	40-95	30-85	5-35	0-5	<10	NP

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
HfA, HgA, HgB, HgC, HgD, [1]HSF---------Hoosic	0-8	Gravelly loam, cobbly loam.	GM, SM, GP-GM, SP-SM	A-1, A-2, A-4	5-20	40-80	35-70	20-65	10-50	30-45	2-10
	8-20	Gravelly sandy loam, very gravelly sandy loam, cobbly loam.	GM, SM, GP-GM, SP-SM	A-1, A-2, A-4	5-20	40-75	35-65	20-60	10-45	20-30	2-8
	20-80	Very cobbly sand, very gravelly loamy sand.	GM, GP, SP, SM	A-1	10-25	35-65	30-50	15-40	2-20	---	NP
HuB, HuC-----------Hudson	0-7	Silt loam-------	ML, CL-ML	A-4, A-5, A-6, A-7	0	95-100	95-100	85-100	65-95	25-48	5-19
	7-38	Silty clay, silty clay loam.	CL, CH	A-7, A-6	0	95-100	90-100	80-100	80-100	35-65	15-35
	38-60	Stratified silty clay to silt.	CL, CL-ML	A-7, A-6	0	95-100	90-100	80-100	60-100	35-65	15-35
[1]HvC3, [1]HwD, [1]HXE: Hudson------------	0-6	Silty clay loam	ML, CL, CL-ML	A-4, A-5, A-6, A-7	0	95-100	95-100	85-100	65-95	25-48	5-19
	6-27	Silty clay, silty clay loam.	CL, CH	A-7, A-6	0	95-100	90-100	80-100	80-100	35-65	15-35
	27-60	Stratified silty clay to silt.	CL, CH	A-7, A-6	0	95-100	90-100	80-100	60-100	35-65	15-35
Schoharie---------	0-7	Silty clay loam	ML, CL	A-6, A-7	0	100	95-100	80-100	65-95	35-50	12-20
	7-29	Silty clay, silty clay loam.	CL, ML	A-6, A-7	0	100	95-100	90-100	80-100	30-45	12-20
	29-50	Silty clay, silty clay loam.	CL	A-6	0	100	95-100	90-100	80-100	20-35	12-20
LaB, LaC-----------Lackawanna	0-7	Flaggy silt loam	GM, ML, CL, SM	A-4	10-20	40-80	40-75	35-70	45-60	---	---
	7-17	Flaggy loam, channery silt loam, gravelly silt loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	40-80	40-75	35-70	20-60	20-35	1-14
	17-80	Flaggy silt loam, channery silt loam, gravelly sandy loam.	GM, SM, ML, CL	A-2, A-4, A-6	0-20	50-85	40-80	35-75	20-55	15-35	1-12
[1]LCD, [1]LCF: Lackawanna--------	0-3	Very bouldery silt loam.	ML, CL, GM, SM	A-4, A-2	3-20	40-100	40-95	35-90	20-85	---	---
	3-17	Channery loam, silt loam, flaggy loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	40-80	40-75	35-70	20-60	20-35	1-14
	17-80	Channery loam, gravelly silt loam, flaggy sandy loam.	GM, SM, ML, CL	A-2, A-4, A-6	0-20	50-85	40-80	35-75	20-55	15-35	<12

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1LCD, 1LCF:											
Swartswood	0-4	Very bouldery fine sandy loam.	SM, GM	A-2, A-4, A-1	3-15	60-90	50-85	30-80	15-45	---	---
	4-33	Channery loam, gravelly sandy loam, gravelly fine sandy loam.	SM, ML, GM	A-2, A-4, A-1	0-25	60-90	50-90	30-85	15-65	<25	NP-3
	33-60	Gravelly fine sandy loam, very gravelly sandy loam, gravelly loam.	GM, SM, ML, GW-GM	A-2, A-1, A-4	5-25	50-80	35-80	20-70	10-60	<20	NP-3
1LEE:											
Lackawanna	0-3	Extremely bouldery silt loam, extremely bouldery loam.	ML, CL, GM, SM	A-4	5-25	40-100	40-95	35-90	40-85	---	---
	3-23	Channery loam, gravelly silt loam, flaggy loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	40-80	40-75	35-70	20-60	20-35	1-14
	23-80	Channery loam, gravelly silt loam, flaggy sandy loam.	GM, SM, ML, CL	A-2, A-4, A-6	0-20	50-85	40-80	35-75	20-55	15-35	<12
Swartswood	0-4	Extremely bouldery sandy loam, extremely bouldery loam.	SM, ML	A-2, A-4, A-1	5-20	60-90	50-85	30-80	15-65	---	---
	4-29	Channery loam, flaggy sandy loam, gravelly fine sandy loam.	SM, ML, GM	A-2, A-4, A-1	0-25	60-90	50-90	30-85	15-65	<25	NP-3
	29-60	Gravelly fine sandy loam, very gravelly sandy loam, gravelly loam.	GM, SM, ML, GW-GM	A-2, A-1, A-4	5-25	50-80	35-80	20-70	10-60	<20	NP-3
Lm-Lamson	0-10	Fine sandy loam	SM, ML, OL	A-4	0	95-100	90-100	70-90	40-85	<20	NP-4
	10-32	Fine sandy loam, sandy loam.	SM, ML	A-4, A-2	0	95-100	80-100	52-90	25-55	<20	NP-4
	32-50	Stratified fine sand to very fine sandy loam.	SM, ML	A-2, A-4	0	95-100	80-100	60-90	20-60	---	NP
LnB-Lordstown	0-8	Channery silt loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	8-34	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
1LOC:											
Lordstown	0-4	Channery silt loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	4-32	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
[1]LOC:											
Arnot	0-3	Channery silt loam.	ML, GM, SM	A-2, A-4	5-10	60-85	55-80	45-80	30-70	<30	NP-5
	3-17	Very channery silt loam, very channery loam.	GM, GM-GC	A-2, A-4, A-1	10-25	30-60	25-55	20-55	15-50	<30	NP-5
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
[1]LY:											
Lyons	0-9	Very stony silt loam.	ML, OL, SM	A-2, A-4, A-6	2-10	60-75	55-70	50-90	30-85	30-40	5-15
	9-32	Silt loam, gravelly fine sandy loam, silty clay loam.	CL, GC, CL-ML, GM-GC	A-4, A-6	0-15	60-95	55-90	45-85	25-80	20-35	5-15
	32-50	Gravelly loam, gravelly silt loam, very gravelly fine sandy loam.	CL, GC, SC, GM-GC	A-2, A-4, A-6, A-1	5-10	35-95	30-90	25-85	15-80	20-35	5-15
Atherton	0-7	Very stony silt loam.	ML, OL, CL, CL-ML	A-4, A-7, A-6	2-10	95-100	90-100	75-95	55-85	25-50	5-20
	7-28	Silt loam, silty clay loam, gravelly loam.	GM-GC, CL, ML, CL-ML	A-4, A-6, A-7	0-5	65-95	60-95	50-90	40-80	25-40	5-20
	28-65	Stratified sand and gravelly to silty clay.	GM-GC, ML, CL-ML, GM	A-2, A-4, A-1	0-5	50-80	45-75	25-70	20-60	5-15	NP-5
Ma Madalin	0-8	Silty clay loam	ML, MH	A-6, A-7	0	95-100	95-100	85-100	65-95	35-55	12-20
	8-45	Silty clay, silty clay loam.	CH, CL	A-7	0	95-100	95-100	85-100	70-95	45-65	25-35
	45-50	Silty clay, silty clay loam.	CL, CL-ML	A-6, A-4	0	95-100	95-100	85-100	70-95	25-35	5-15
MdB Mardin	0-10	Gravelly silt loam.	GM, ML, CL, GC	A-4	0-10	60-70	55-65	45-65	35-60	25-35	5-10
	10-21	Channery silt loam, channery loam, gravelly loam.	CL, GC, CL-ML	A-4	5-10	60-75	55-70	45-70	35-65	15-25	5-10
	21-46	Gravelly loam, channery silt loam, very channery loam.	CL, GC, SC, CL-ML	A-2, A-4	10-25	55-75	50-70	40-70	30-65	20-30	5-10
	46-56	Gravelly loam, channery silt loam, very channery silt loam.	CL, GC, SC, CL-ML	A-2, A-4	10-25	55-75	50-70	40-70	30-65	20-30	5-10

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
[1]MgB:											
Mardin------------	0-10	Gravelly silt loam.	GM, ML, CL, GC	A-4	0-10	60-70	55-65	45-65	35-60	25-35	5-10
	10-21	Channery silt loam, channery loam, gravelly loam.	CL, GC, CL-ML	A-4	5-10	60-75	55-70	45-70	35-65	15-25	5-10
	21-48	Gravelly loam, channery silt loam, very channery loam.	CL, GC, SC, CL-ML	A-2, A-4	10-25	55-75	50-70	40-70	30-65	20-30	5-10
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Nassau------------	0-6	Shaly silt loam	ML, GM, SM	A-2, A-4	5-20	50-85	45-80	40-75	25-70	10-20	1-6
	6-16	Very shaly silt loam, very shaly loam.	GM	A-2, A-4	10-25	45-70	25-55	20-55	15-50	10-20	1-6
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Mn----------------- Menlo	0-13	Silt loam-------	ML	A-4, A-5	0-5	80-95	65-95	65-85	55-70	<45	NP-8
	13-60	Gravelly fine sandy loam, loam, gravelly silt loam.	GM, ML, SM	A-4, A-5	0-10	65-90	55-90	45-80	35-70	<45	NP-8
MO----------------- Menlo	0-13	Very bouldery silt loam, very bouldery fine sandy loam.	ML	A-4, A-5	3-15	80-95	65-90	65-85	55-70	<45	NP-8
	13-50	Gravelly fine sandy loam, loam, gravelly silt loam.	ML, GM, SM	A-4, A-5	0-10	65-90	55-85	45-80	35-70	<45	NP-8
Mr----------------- Middlebury	0-8	Silt loam-------	ML	A-4	0	85-100	75-100	65-100	45-85	<20	NP-4
	8-52	Silt loam, loam, gravelly sandy loam.	ML, SM	A-4, A-2	0	75-100	70-100	50-100	30-85	<20	NP-4
[1]MTB:											
Morris------------	0-10	Very bouldery silt loam.	GM, ML, SM	A-4, A-2	3-10	60-95	55-80	40-80	30-70	20-30	1-10
	10-18	Flaggy silt loam, gravelly loam, channery loam.	GM, ML, SM	A-2, A-4	0-20	65-95	60-90	50-80	35-70	20-30	1-3
	18-60	Channery loam, channery silt loam, channery silty clay loam.	GM, ML, SM	A-2, A-4	0-10	60-95	45-80	40-80	25-75	15-25	NP-9
Tuller------------	0-7	Very bouldery silt loam, very bouldery loam.	GM, ML	A-4, A-1	3-20	65-90	50-80	50-80	35-75	30-40	2-7
	7-18	Very channery silt loam, very channery loam, flaggy very fine sandy loam.	GM, ML, SM	A-2, A-4, A-1	5-20	40-85	35-80	30-80	20-70	20-30	2-7
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
[1]NBF: Nassau	0-3	Very shaly silt loam, shaly silt loam.	ML, GM, SM	A-2, A-4	5-20	50-85	45-80	40-75	25-70	10-20	1-6
	3-16	Very shaly silt loam, very shaly loam.	GM	A-2, A-4	10-25	45-70	25-55	20-55	15-50	10-20	1-6
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bath	0-4	Gravelly loam, gravelly silt loam.	ML, GM, SM, OL	A-2, A-4	5-15	60-95	50-95	40-85	30-80	30-40	5-10
	4-26	Channery loam, gravelly silt loam.	SM, GM, ML	A-2, A-4	5-10	65-95	50-90	40-85	20-80	20-35	NP-7
	26-48	Channery silt loam, very gravelly sandy loam.	GM, SM, GM-GC, ML	A-1, A-2, A-4	10-15	40-90	30-85	30-85	20-75	20-25	3-6
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
[1]NMC, [1]NNF: Nassau	0-3	Shaly silt loam	ML, GM	A-2, A-4	5-20	50-85	45-80	40-75	25-70	10-20	1-6
	3-16	Very shaly silt loam, very shaly loam.	GM	A-2, A-4	10-25	45-70	25-55	20-55	15-50	10-20	1-6
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Manlius	0-15	Shaly silt loam	ML, GM, SM, CL-ML	A-4	5-10	60-90	55-85	45-85	30-75	<25	NP-5
	15-32	Very shaly silt loam, very shaly loam.	GM, ML, GM-GC, CL-ML	A-2, A-4, A-1	10-25	25-70	20-65	20-65	15-60	<25	NP-5
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]NOD: Nassau	0-6	Shaly silt loam	ML, GM, SM	A-2, A-4	5-20	50-85	45-80	40-75	25-70	10-20	1-6
	6-16	Very shaly silt loam, very shaly loam.	GM	A-2, A-4	10-25	45-70	25-55	20-55	15-50	10-20	1-6
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
OdA, OdB: Odessa	0-8	Silt loam	CL, ML, OL	A-6, A-7	0	100	95-100	80-100	65-95	35-50	12-20
	8-38	Silty clay loam, silty clay.	CL, CH, ML	A-7	0	100	95-100	90-100	80-100	42-55	15-30
	38-50	Silty clay, silty clay loam.	CL, CH	A-6, A-7	0	100	95-100	90-100	80-100	30-55	15-30

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
OgB----------------- Oquaga	0-7	Channery silt loam.	ML, GM, SM	A-4	5-10	60-85	55-80	50-80	35-65	<25	NP-5
	7-32	Very channery loam, very channery silt loam, channery silt loam.	GM, ML	A-1, A-2, A-4	10-25	35-70	25-60	20-60	15-55	<25	NP-5
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]OlC:											
Oquaga-------------	0-7	Channery silt loam.	ML, GM, SM	A-4	5-20	60-85	55-80	50-80	35-65	<25	NP-5
	7-32	Very channery loam, very channery silt loam, channery silt loam.	GM, ML	A-1, A-2, A-4	10-25	35-70	25-60	20-60	15-55	<25	NP-5
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lordstown----------	0-8	Channery silt loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	8-32	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]ORC, [1]ORD:											
Oquaga-------------	0-5	Channery silt loam, very bouldery silt loam.	ML, GM, SM	A-4	5-15	50-85	55-80	50-70	40-65	<25	NP-5
	5-32	Very channery loam, very channery silt loam, channery silt loam.	GM, ML	A-1, A-2, A-4	10-25	35-70	25-60	20-60	15-55	<25	NP-5
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Arnot--------------	0-3	Channery silt loam, very bouldery silt loam.	ML, GM, SM	A-4	5-20	60-85	55-80	45-80	30-70	<30	NP-5
	3-17	Very channery silt loam, very channery loam.	GM, GM-GC	A-2, A-4, A-1	10-25	30-60	25-55	20-55	15-50	<30	NP-5
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Pa----------------- Palms	0-44	Sapric material	PT	A-8	---	---	---	---	---	---	---
	44-56	Clay loam, silt loam, fine sandy loam.	CL-ML, CL, SM	A-4, A-6	0	85-100	80-100	70-95	35-90	25-40	5-20
Pb----------------- Palms bedrock Variant	0-30	Muck-------------	PT	A-8	---	---	---	---	---	---	---
	30-38	Very gravelly loam, silty clay loam, gravelly fine sandy loam.	GM, GC, CL, ML	A-2, A-4, A-6, A-7	0-5	30-100	25-100	20-100	15-95	5-45	NP-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
PlB, PlC: Plainfield	0-9	Loamy sand	SM	A-2, A-4	0	100	100	55-95	15-40	---	NP
	9-32	Sand, loamy sand	SP, SM	A-3, A-1, A-2	0	75-100	75-100	45-85	4-30	---	NP
	32-65	Sand	SW-SP	A-3	0	95-100	90-100	45-70	0-10	---	NP
[1]PmD, [1]PmF:											
Plainfield	0-5	Loamy sand, loamy fine sand.	SM	A-2, A-4	0	100	100	55-95	15-40	---	NP
	5-28	Sand, loamy sand.	SP, SM	A-3, A-1, A-2	0	75-100	75-100	45-85	4-30	---	NP
	28-65	Sand	SW, SP	A-3	0	95-100	90-100	45-70	0-10	---	NP
Riverhead	0-6	Fine sandy loam, loam.	SM, ML	A-4	0-5	95-100	90-100	55-95	30-75	14-18	1-3
	6-23	Sandy loam, fine sandy loam, gravelly sandy loam.	SM, GM	A-2, A-4, A-1	0-5	65-100	60-95	40-80	20-45	14-18	1-3
	23-62	Loamy sand, gravelly loamy sand.	SM, GM, SP-SM, GP-GM	A-1, A-2, A-4	0-5	75-100	70-95	30-70	5-30	---	NP
[1]PrC:											
Plainfield	0-9	Loamy sand	SM	A-2, A-4	0	100	100	55-95	15-40	---	NP
	9-32	Sand, loamy sand, loamy coarse sand.	SP, SM	A-3, A-1, A-2	0	75-100	75-100	45-70	4-30	---	NP
	32-65	Sand	SW-SP	A-3	0	95-100	95-100	45-70	0-10	---	NP
Rock outcrop.											
Pt: Pompton	0-9	Fine sandy loam	SM, SC, SM-SC	A-4	0	85-100	85-100	65-85	35-50	20-30	3-10
	9-29	Fine sandy loam, sandy loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	95-100	95-100	45-75	30-50	20-30	3-10
	29-61	Stratified sandy loam to sand.	SM, SP, SP-SM	A-1, A-2, A-6	0	90-100	90-100	45-75	5-45	<20	NP
Ra: Raynham	0-8	Silt loam	ML	A-4	0	100	95-100	80-100	55-95	<20	NP
	8-37	Silt loam, silt, very fine sandy loam.	ML	A-4	0	100	95-100	80-100	55-95	<20	NP
	37-56	Silt loam, silt, very fine sandy loam.	ML	A-4	0	100	95-100	80-100	55-95	<20	NP
Re: Red Hook	0-8	Gravelly silt loam.	ML, SM, GM, OL	A-4	0-5	60-80	55-75	50-75	40-65	20-30	2-4
	8-30	Silt loam, loam, very gravelly sandy loam.	ML, SM, GM, GP-GM	A-1, A-2, A-4	0-5	30-90	25-85	15-80	10-70	20-30	2-4
	30-50	Gravelly silt loam, very gravelly sandy loam.	GM, GP-GM	A-1, A-2, A-4	5-10	30-65	25-60	15-55	10-50	20-30	2-4
RhA, RhB: Rhinebeck	0-8	Silt loam	ML, MH, OL	A-6, A-7	0	90-100	85-100	70-100	60-90	30-55	10-25
	8-35	Silty clay loam, silty clay.	CH, CL	A-7	0	90-100	85-100	80-100	70-95	45-65	25-35
	35-50	Stratified silty clay to silt loam.	CL, CL-ML	A-7, A-6, A-4	0	90-100	85-100	80-100	70-95	45-65	25-35

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
RvA, RvB, RvC------ Riverhead	0-8	Fine sandy loam	SM, ML	A-2, A-4	0-5	95-100	90-100	55-95	30-75	14-18	1-3
	8-26	Sandy loam, fine sandy loam, gravelly sandy loam.	SM, GM	A-2, A-4, A-1	0-5	65-100	60-95	40-80	20-45	14-18	1-3
	26-62	Loamy sand, gravelly loamy sand.	SM, GM, SP-SM, GP-GM	A-1, A-2, A-4	0-5	75-100	70-95	30-70	5-30	---	NP
[1]RXC: Rock outcrop.											
Arnot-------------	0-3	Channery silt loam, channery loam.	ML, GM, SM	A-2, A-4	5-10	60-85	55-80	45-80	30-70	<30	NP-5
	3-17	Very channery silt loam, very gravelly loam.	GM, GM-GC	A-2, A-4, A-1	10-25	30-60	25-55	20-55	15-50	<30	NP-5
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]RXE: Rock outcrop.											
Arnot-------------	0-3	Very bouldery silt loam, very bouldery loam.	ML, GM	A-2, A-4	10-20	60-85	50-80	50-80	30-70	<30	NP-5
	3-17	Very channery silt loam, very gravelly loam.	GM	A-2, A-4, A-1	10-25	50-65	40-60	35-55	30-50	<30	NP-5
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]RXF: Rock outcrop.											
Arnot-------------	0-3	Extremely bouldery silt loam, extremely bouldery loam.	ML, GM	A-4	10-30	70-85	65-80	55-80	40-70	<30	NP-5
	3-17	Very channery silt loam, very gravelly loam.	GM	A-1, A-2, A-4	10-25	50-65	40-60	35-55	30-50	<30	NP-5
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
SaB, SaC----------- Schoharie	0-10	Silt loam-------	ML, CL	A-6, A-7	0	100	95-100	80-100	65-95	35-50	12-20
	10-36	Silty clay, silty clay loam.	CL	A-6, A-7	0	100	95-100	90-100	80-100	30-45	12-20
	36-50	Silty clay, silty clay loam.	CL	A-6	0	100	95-100	90-100	80-100	20-35	12-20
Sc---------------- Scio	0-10	Silt loam-------	ML, SM	A-4	0	100	95-100	90-100	70-100	<20	NP-4
	10-47	Silt loam, very fine sandy loam.	ML, SM	A-4	0	100	95-100	90-100	70-100	<20	NP-4
	47-55	Stratified very gravelly sand to silt loam.	ML, SM, SP, GM	A-4, A-2, A-1, A-3	0	35-95	30-90	15-85	2-80	<10	NP-4

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
[1]SdB:											
Scriba------------	0-13	Gravelly fine sandy loam, gravelly loam.	SM, GM, ML	A-2, A-4, A-1	0-5	55-80	50-75	40-65	20-55	<15	NP-4
	13-50	Gravelly fine sandy loam, very gravelly sandy loam, gravelly loam.	GM, ML, SM	A-2, A-4, A-1	0-5	35-75	30-70	20-65	15-60	<15	NP-4
Morris------------	0-13	Flaggy silt loam	GM, ML, SM	A-4, A-2	0-10	60-95	55-75	45-75	30-65	20-30	1-10
	13-80	Channery silt loam, channery loam, channery silty clay loam.	GM, ML, SM	A-2, A-4	0-10	60-95	45-80	40-80	25-75	15-25	NP-9
[1]SEB:											
Scriba------------	0-13	Very bouldery fine sandy loam.	SM, GM, ML	A-2, A-4, A-1	3-10	55-90	55-80	40-70	20-60	<15	NP-4
	13-50	Gravelly fine sandy loam, very gravelly sandy loam, gravelly loam, very bouldery loam.	GM, ML, SM	A-2, A-4, A-1	0-5	35-70	30-70	20-65	15-60	<15	NP-4
Morris------------	0-13	Very stony silt loam.	GM, ML, SM	A-4, A-2	3-10	60-95	55-80	40-80	30-70	20-30	1-10
	13-80	Channery loam, channery silt loam, channery silty clay loam.	GM, ML, SM	A-2, A-4	0-10	60-95	45-80	40-80	25-75	15-25	NP-9
[1]SGB:											
Scriba------------	0-13	Extremely bouldery fine sandy loam, extremely bouldery loam.	GM, ML, SM	A-2, A-4, A-1	5-20	65-90	50-80	40-75	20-60	<15	NP-4
	13-50	Gravelly fine sandy loam, very gravelly sandy loam, gravelly silt loam.	GM, ML, SM	A-2, A-4, A-1	0-10	35-70	30-70	20-65	15-60	<15	NP-4
Morris------------	0-17	Extremely bouldery silt loam, extremely bouldery loam.	GM, ML, CL, SM	A-4, A-2	5-25	60-95	55-80	40-80	30-70	20-30	1-10
	17-80	Gravelly loam, flaggy silt loam, very channery silty clay loam.	GM, ML, SM	A-2, A-4	0-20	60-95	45-80	40-80	25-75	15-25	NP-9

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
[1]SmB, [1]SmC:											
Stockbridge	0-7	Gravelly silt loam.	ML, GM, SM	A-4	0-5	65-80	60-75	55-75	45-75	25-35	3-8
	7-34	Loam, silt loam, gravelly silt loam.	ML, SM, CL-ML, GM-GC	A-4	0-5	65-95	60-90	60-85	40-75	20-30	3-8
	34-56	Loam, silt loam, gravelly loam.	ML, SM, CL-ML, GM-GC	A-4	0-5	60-95	55-90	50-80	35-75	<30	NP-8
	56	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Farmington	0-7	Gravelly silt loam.	ML, CL, GM, GC	A-2, A-4, A-6, A-1	0-5	55-80	50-75	35-70	20-65	20-35	3-15
	7-15	Silt loam, loam, gravelly fine sandy loam.	ML, CL, GM, GC	A-2, A-4, A-6, A-1	0-5	60-95	55-90	35-85	20-80	20-35	3-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]STD:											
Stockbridge	0-5	Gravelly silt loam.	ML, GM-SM	A-4	0-5	60-80	60-75	55-75	45-75	25-35	3-8
	5-29	Loam, silt loam, gravelly silt loam.	ML, SM, CL-ML, GM-GC	A-4	0-5	65-95	60-90	60-85	40-75	20-30	3-8
	29-48	Loam, silt loam, gravelly loam.	ML, SM, CL-ML, GM-GC	A-4	0-5	60-95	55-90	50-80	35-75	<30	NP-8
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Farmington	0-5	Gravelly silt loam.	ML, CL, GM-GC, GM	A-2, A-4, A-6, A-1	0-5	55-80	50-75	45-70	35-65	20-35	3-15
	5-15	Silt loam, loam, gravelly fine sandy loam.	ML, CL, GM-GC, GM	A-2, A-4, A-6, A-1	0-5	60-95	55-90	35-85	20-80	20-35	3-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Su Suncook	0-3	Loamy fine sand	SM	A-2	0	95-100	85-100	65-70	15-35	---	NP
	3-53	Stratified loamy fine sand to gravelly coarse sand.	SP, SM, SW	A-1, A-2, A-3	0	60-100	45-100	20-95	0-35	---	NP
SwB, SwC Swartswood	0-7	Stony fine sandy loam.	SM, ML	A-1, A-2, A-4	0-20	60-90	50-85	30-80	15-65	---	---
	7-29	Gravelly fine sandy loam, very gravelly sandy loam, gravelly loam.	SM, ML, GM	A-1, A-2, A-4, A-3	0-25	60-90	50-90	30-85	15-65	<25	NP-3
	29-60	Gravelly fine sandy loam, very gravelly sandy loam, gravelly loam.	GM, SM, ML, GW-GM	A-1, A-2, A-4, A-3	5-25	50-85	35-80	20-75	10-60	<20	NP-3

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Te-----------------Teel	0-10	Silt loam--------	ML, CL, CL-ML,	A-4, A-6	0	100	95-100	90-100	60-90	15-35	2-15
	10-38	Silt loam, very fine sandy loam.	ML, CL-ML, CL	A-4, A-6	0	100	95-100	80-100	50-90	15-35	2-15
	38-50	Silt loam, fine sandy loam, gravelly very fine sandy loam.	ML, SM, CL, SM-SC	A-4, A-6	0-5	75-100	70-100	50-100	30-90	<25	NP-15
Tg-----------------Tioga	0-10	Fine sandy loam	ML, SM	A-4	0	100	95-100	65-95	40-85	<15	NP-4
	10-34	Silt loam, loam, gravelly fine sandy loam.	SM, GM, ML	A-1, A-2, A-4	0	55-100	50-100	35-100	20-90	<15	NP-2
	34-65	Silt loam, gravelly sandy loam, very gravelly loamy sand.	GW-GM, GM, SM, ML	A-1, A-2, A-4, A-3	0-10	35-100	30-100	15-100	5-90	<15	NP-2
TkA, TkB, TkC-------Tunkhannock	0-7	Gravelly loam---	SM, GM, ML	A-2, A-4	0-15	50-90	55-70	45-60	30-55	---	---
	7-30	Gravelly silt loam, cobbly loam, very gravelly sandy loam.	SM, GM, ML, GP-GM	A-2, A-1, A-4	0-25	40-80	25-75	20-70	10-65	<25	NP-3
	30-80	Gravelly sandy loam, very gravelly loamy sand, very cobbly sand.	SM, GM, GP, SP	A-1, A-2	5-25	30-80	25-70	15-55	5-15	<20	NP-2
TuB, TuC, TuD-------Tunkhannock	0-7	Gravelly loam---	ML, SM, GM	A-2, A-4	0-15	60-80	55-75	45-70	30-55	---	NP
	7-30	Gravelly loam, gravelly silt loam, very gravelly sandy loam.	SM, GM, ML, GP-GM	A-1, A-2, A-4	0-25	40-80	25-75	20-70	10-65	<25	NP-3
	30-42	Very cobbly sand, very gravelly loamy sand, gravelly sandy loam.	SM, GM, SP-SM, GP-GM	A-1, A-2, A-3	5-25	30-80	25-70	15-55	5-15	<20	NP-2
	42-80	Silty clay, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
Un-----------------Unadilla	0-10	Silt loam--------	ML	A-4	0	100	95-100	90-100	60-90	15-20	2-4
	10-60	Silt loam, very fine sandy loam.	ML	A-4	0	100	95-100	90-100	60-90	15-20	2-4
	42-50	Stratified very gravelly sand to silty clay loam.	GM, GC, ML, CL	A-4, A-2, A-1, A-6	0-10	35-100	25-95	15-90	5-85	15-40	NP-15

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
[1]VAB, [1]VAD: Valois	0-2	Very bouldery silt loam, very bouldery loam.	ML, SM	A-4, A-2	5-10	70-95	60-90	50-90	30-80	<25	NP-5
	2-40	Gravelly loam, gravelly silt loam, gravelly fine sandy loam.	GM, ML, SM	A-4, A-2, A-1	0-10	60-75	55-70	40-70	20-60	<25	NP-5
	40-65	Very gravelly fine sandy loam, very gravelly loam.	GM, GW-GM	A-1, A-2	0-15	30-60	20-55	15-45	10-35	<25	NP-7
VoA, VoB, VoC: Volusia	0-8	Gravelly silt loam.	GM, ML, CL	A-4	0-5	70-85	65-80	55-80	40-70	30-40	5-10
	8-19	Channery silt loam, channery loam, silt loam.	CL-ML, CL, GM-GC, SC	A-4	5-10	65-90	60-85	50-85	35-75	15-25	5-10
	19-70	Channery silt loam, channery loam, silty clay loam.	GM-GC, CL, GC, CL-ML	A-4	10-25	75-90	70-85	60-85	40-80	20-30	5-10
[1]VSB: Volusia	0-6	Very stony silt loam.	GM, ML, CL	A-4	10-15	65-85	60-80	50-80	35-70	30-40	5-10
	6-19	Channery silt loam, channery loam, gravelly loam.	CL-ML, CL, GM-GC, SC	A-4	5-10	70-85	65-80	55-80	40-70	15-25	5-10
	19-70	Channery silt loam, channery loam.	GM-GC, CL-ML, CL, GC	A-4	10-25	75-90	70-85	60-85	40-75	20-30	5-10
Wa: Walpole	0-10	Fine sandy loam	SM	A-4	0	90-100	85-100	70-100	40-50	<25	NP-3
	10-27	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	75-100	90-100	55-95	25-50	---	NP
	27-60	Gravelly loamy sand, gravelly sand, sand.	SM, SP-SM	A-1, A-2, A-3	0	75-100	70-100	35-75	5-25	---	NP
Wb, Wc: Wayland	0-8	Silt loam, mucky silt loam.	ML, OL	A-7, A-5	0	100	95-100	90-100	70-95	40-50	5-15
	8-26	Silt loam, silty clay loam.	ML, CL-ML	A-6, A-4	0	100	95-100	90-100	70-95	25-40	5-15
	26-50	Stratified silt loam to gravelly fine sandy loam.	CL, SC, CL-ML, SM-SC	A-2, A-4	0	65-100	55-100	50-95	25-90	15-25	5-10
WeB, WeC: Wellsboro	0-9	Flaggy silt loam	ML, CL, SM	A-4	10-20	70-90	60-85	55-80	45-70	---	---
	9-21	Flaggy loam, channery silt loam, gravelly loam.	ML, GM, SM	A-4	0-15	70-90	60-80	55-80	40-70	15-40	NP-10
	21-60	Flaggy loam, very channery sandy loam, channery silt loam.	SM, GM, ML, CL	A-2, A-4	0-20	55-90	45-80	35-80	25-60	15-30	NP-10

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
[1]WLB:											
Wellsboro----------	0-9	Very bouldery silt loam.	ML, CL, SM	A-4	3-20	70-90	65-80	60-80	45-75	---	---
	9-21	Flaggy loam, channery silt loam, gravelly loam.	ML, GM, SM	A-4	0-15	70-90	60-80	55-80	40-70	15-40	NP-10
	21-50	Flaggy loam, channery silt loam, very channery sandy loam.	GM, ML, CL, SM	A-2, A-4	0-20	55-90	45-90	35-80	25-60	15-30	NP-10
Wurtsboro----------	0-6	Very bouldery fine sandy loam.	SM, GM	A-2, A-4	3-15	60-85	55-80	40-70	30-45	---	---
	6-19	Fine sandy loam, gravelly sandy loam, channery loam.	SM, ML	A-2, A-4, A-1	0-15	70-95	50-90	35-85	15-70	<30	NP-4
	19-56	Gravelly sandy loam, very gravelly fine sandy loam, channery loam.	SM, GM, ML, SP-SM	A-1, A-2, A-4	0-20	50-95	30-90	20-80	10-70	<25	NP-4
[1]WOB:											
Wellsboro----------	0-7	Extremely bouldery silt loam.	ML, CL, SM	A-4	5-25	70-100	65-85	60-80	45-75	---	---
	7-21	Flaggy loam, channery silt loam, gravelly loam.	ML, SM	A-4	0-15	70-100	60-80	55-80	40-70	15-40	NP-10
	21-60	Loam, channery silt loam, very channery sandy loam.	GM, ML, CL, SM	A-2, A-4	0-20	55-90	45-90	35-80	25-60	15-30	NP-10
Wurtsboro----------	0-6	Extremely bouldery fine sandy loam.	SM, GM	A-2, A-4	5-20	70-85	65-80	45-70	30-45	---	---
	6-19	Fine sandy loam, gravelly sandy loam, channery loam.	SM, ML	A-2, A-4,	0-15	70-95	50-90	35-85	15-70	<30	NP-4
	19-56	Gravelly fine sandy loam, very gravelly sandy loam, channery loam.	SM, GM, ML, SP-SM	A-1, A-2, A-4	0-20	40-95	30-90	20-80	10-70	<25	NP-4
WsA, WsB----------- Williamson	0-8	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	60-90	20-30	1-6
	8-18	Silt loam, very fine sandy loam.	ML	A-4	0	100	95-100	80-100	50-90	10-20	1-6
	18-42	Silt loam, very fine sandy loam.	ML	A-4	0	100	95-100	80-100	50-90	10-20	1-6
	42-52	Stratified silty clay loam to very fine sandy loam.	ML, SM	A-4	0	95-100	90-100	65-95	40-90	<15	NP-3

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
WuB----------------- Wurtsboro	0-6	Stony loam------	SM, GM	A-2, A-4	0-10	60-95	55-90	55-85	30-50	---	---
	6-19	Fine sandy loam, gravelly sandy loam, channery loam.	SM	A-2, A-4	0-15	70-95	65-90	40-85	30-50	<30	NP-4
	19-56	Very gravelly fine sandy loam, gravelly sandy loam, channery loam.	SM, GM	A-2, A-4	0-20	40-95	30-90	20-80	10-50	<25	NP-4

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH			
AA. Alluvial land							
AcB: Arnot	0-7	0.6-2.0	0.10-0.15	3.6-6.0	Low	0.24	2-1
	7-17	0.6-2.0	0.08-0.12	3.6-6.0	Low	0.17	
	17	---	---	---	---	---	
[1]ARD:							
Arnot	0-2	0.6-2.0	0.10-0.15	3.6-6.0	Low	0.24	2-1
	2-14	0.6-2.0	0.08-0.12	3.6-6.0	Low	0.17	
	14	---	---	---	---	---	
Lordstown	0-4	0.6-2.0	0.11-0.17	4.5-5.5	Low	0.20	3
	4-32	0.6-2.0	0.10-0.16	4.5-5.5	Low	0.28	
	32	---	---	---	---	---	
Rock outcrop.	---	---	---	---	---	---	
[1]ARF:							
Arnot	0-3	0.6-2.0	0.10-0.15	3.6-6.0	Low	0.24	2-1
	3-14	0.6-2.0	0.08-0.12	3.6-6.0	Low	0.17	
	14	---	---	---	---	---	
Oquaga	0-5	0.6-2.0	0.08-0.17	3.6-6.0	Low	0.24	3
	5-26	0.6-2.0	0.04-0.12	3.6-6.0	Low	0.28	
	26	---	---	---	---	---	
Rock outcrop.							
At: Atherton	0-7	0.6-2.0	0.16-0.21	5.1-7.3	Low	---	---
	7-28	0.6-2.0	0.10-0.19	5.6-7.8	Low	---	
	28-65	0.6-6.0	0.05-0.12	6.1-7.8	Low	---	
Ba: Barbour	0-6	0.6-2.0	0.16-0.21	4.5-6.0	Low	0.49	4
	6-28	2.0-6.0	0.10-0.19	4.5-6.0	Low	0.64	
	28-50	6.0-20	0.02-0.07	4.5-6.5	Low	0.17	
Be: Basher	0-9	0.6-2.0	0.15-0.21	4.5-6.0	Low	---	---
	9-27	0.6-2.0	0.10-0.19	4.5-6.0	Low	---	
	27-52	0.6-6.0	0.10-0.19	5.1-6.5	Low	---	
BgC, BgD: Bath	0-6	0.6-2.0	0.10-0.20	4.5-6.0	Low	0.24	3
	6-28	0.6-2.0	0.08-0.18	4.5-6.0	Low	0.28	
	28-55	<0.2	0.01-0.06	4.5-6.0	Low	0.28	
	55-65	<0.2	0.01-0.06	5.1-8.4	Low	0.28	
[1]BHE: Bath	0-4	0.6-2.0	0.10-0.20	4.5-6.0	Low	0.24	3
	4-26	0.6-2.0	0.08-0.18	4.5-6.0	Low	0.28	
	26-50	0.06-0.2	0.01-0.06	4.5-6.0	Low	0.28	
	50-60	0.06-0.2	0.01-0.06	5.1-8.4	Low	0.28	
[1]BnC:							
Bath	0-6	0.6-2.0	0.10-0.20	4.5-6.0	Low	0.24	3
	6-28	0.6-2.0	0.08-0.18	4.5-6.0	Low	0.28	
	28-48	<0.2	0.01-0.06	4.5-6.5	Low	0.28	
	48	---	---	---	---	---	
Nassau	0-6	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.20	2
	6-16	0.6-2.0	0.07-0.12	4.5-5.5	Low	0.20	
	16	---	---	---	---	---	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH			
[1]BOD:							
Bath	0-6	0.6-2.0	0.10-0.20	4.5-6.0	Low	0.24	3
	6-28	0.6-2.0	0.08-0.18	4.5-6.0	Low	0.28	
	28-48	<0.2	0.01-0.06	4.5-6.5	Low	0.28	
	48	---	---	---	---	---	
Nassau	0-6	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.20	2
	6-16	0.6-2.0	0.07-0.12	4.5-5.5	Low	0.20	
	16	---	---	---	---	---	
Rock outcrop.	---	---	---	---	---	---	
[1]BRC:							
Bath	0-5	0.6-2.0	0.10-0.20	4.5-6.0	Low	0.24	3
	5-28	0.6-2.0	0.08-0.18	4.5-6.0	Low	0.28	
	28-55	0.06-0.2	0.01-0.06	4.5-6.0	Low	0.28	
	55-65	0.06-0.2	0.01-0.06	5.1-8.4	Low	0.28	
Mardin	0-6	0.6-2.0	0.11-0.17	4.5-6.0	Low	0.24	3
	6-21	0.6-2.0	0.09-0.16	4.5-6.0	Low	0.28	
	21-46	<0.2	0.01-0.03	4.5-6.5	Low	0.28	
	46-56	<0.2	0.01-0.03	5.1-8.4	Low	0.28	
CaB, CaC Cambridge	0-6	0.6-2.0	0.18-0.22	4.5-5.5	Low	0.20	4
	6-23	0.6-2.0	0.11-0.17	4.5-5.5	Low	0.28	
	23-64	<0.2	0.06-0.09	6.1-7.3	Low	0.28	
Cc Canandaigua	0-9	0.6-2.0	0.20-0.35	5.6-7.8	Low	0.49	3
	9-37	0.2-0.6	0.19-0.20	6.1-7.8	Low	0.49	
	37-60	0.2-0.6	0.19-0.20	6.6-8.4	Low	0.49	
Cd Canandaigua	0-9	0.6-2.0	0.20-0.35	5.6-7.8	Low	0.49	3
	9-37	0.2-0.6	0.19-0.20	6.1-7.8	Low	0.49	
	37-40	0.2-0.6	0.19-0.20	6.6-8.4	Low	0.49	
	40-60	0.2-0.6	0.10-0.15	6.6-8.4	Low	0.28	
Ce Carlisle	0-61	0.2-6.0	0.35-0.45	5.6-7.3	---	---	---
CgA, CgB Castile	0-8	0.6-6.0	0.09-0.16	4.5-5.5	Low	0.24	3
	8-28	0.6-6.0	0.05-0.13	4.5-5.5	Low	0.20	
	28-50	>6.0	0.01-0.02	5.1-6.5	Low	0.17	
CkB, CkC Cayuga	0-8	0.6-2.0	0.15-0.21	5.6-7.3	Low	0.49	3
	8-29	0.06-0.2	0.11-0.17	5.6-7.8	Low	0.28	
	29-50	0.06-0.2	0.08-0.18	6.6-8.4	Low	0.28	
CnA, CnB, CnC Chenango	0-9	0.6-6.0	0.08-0.15	4.5-5.5	Low	0.24	3
	9-35	0.6-6.0	0.05-0.14	4.5-6.0	Low	0.20	
	35-80	6.0-20	0.01-0.03	5.1-6.5	Low	0.17	
CvA, CvB Churchville	0-10	0.6-2.0	0.16-0.21	5.6-7.3	Low	0.49	3
	10-34	<0.2	0.13-0.17	6.1-7.8	Moderate	0.28	
	34-54	0.06-0.6	0.07-0.17	7.4-8.4	Low	0.28	
[1]FAE:							
Farmington	0-3	0.6-2.0	0.12-0.15	5.1-6.5	Low	0.28	2
	3-12	0.6-2.0	0.07-0.18	5.6-7.3	Low	0.28	
	12	---	---	---	---	---	
Rock outcrop.	---	---	---	---	---	---	
FW. Fresh water marsh	---	---	---	---	---	---	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH			
Ha------------- Hamlin	0-8	0.6-2.0	0.18-0.21	6.1-7.3	Low------------	---	---
	8-38	0.6-2.0	0.17-0.19	6.1-7.3	Low------------	---	
	38-58	0.6-2.0	0.17-0.19	6.6-7.8	Low------------	---	
He------------- Haven	0-11	0.6-2.0	0.15-0.19	4.5-5.0	Low------------	0.43	3
	11-25	0.6-6.0	0.08-0.12	4.5-5.5	Low------------	0.24	
	25-60	>20	0.01-0.03	4.5-5.5	Low------------	0.17	
HfA, HgA, HgB, HgC, HgD, [1]HSF-- Hoosic	0-8	2.0-6.0	0.05-0.12	4.5-5.5	Low------------	0.17	3-2
	8-20	2.0-6.0	0.05-0.11	4.5-5.5	Low------------	0.17	
	20-80	>6.0	0.01-0.05	5.1-6.0	Low------------	0.17	
HuB, HuC--------- Hudson	0-7	0.2-2.0	0.16-0.21	5.1-7.3	Moderate-------	0.49	3
	7-38	<0.2	0.13-0.17	5.1-7.3	Moderate-------	0.28	
	38-60	<0.2	0.12-0.20	6.6-8.4	Moderate-------	0.28	
[1]HvC3, [1]HwD, [1]HXE:							
Hudson---------	0-6	0.2-2.0	0.16-0.21	5.1-7.3	Moderate-------	0.49	2
	6-27	<0.2	0.13-0.17	5.1-7.3	Moderate-------	0.28	
	27-60	<0.2	0.12-0.20	6.6-8.4	Moderate-------	0.28	
Schoharie------	0-7	0.2-0.6	0.17-0.21	5.6-7.3	Moderate-------	0.49	2
	7-29	<0.2	0.12-0.17	5.6-7.8	Moderate-------	0.28	
	29-50	<0.2	0.12-0.14	7.4-8.4	Moderate-------	0.28	
LaB, LaC--------- Lackawanna	0-7	0.6-2.0	0.10-0.14	4.5-5.5	Low------------	0.24	3
	7-17	0.6-2.0	0.10-0.14	4.5-5.5	Low------------	0.28	
	17-80	0.06-0.2	0.01-0.06	4.5-6.0	Low------------	0.28	
[1]LCD, [1]LCF:							
Lackawanna------	0-3	0.6-2.0	0.10-0.16	4.5-5.5	Low------------	0.24	3
	3-17	0.6-2.0	0.10-0.16	4.5-5.5	Low------------	0.28	
	17-80	0.06-0.2	0.01-0.06	4.5-6.0	Low------------	0.28	
Swartswood------	0-4	0.6-2.0	0.08-0.12	3.6-5.5	Low------------	0.20	3
	4-33	0.6-2.0	0.08-0.12	3.6-5.5	Low------------	0.28	
	33-60	0.06-0.6	0.01-0.06	3.6-5.5	Low------------	0.28	
[1]LEE:							
Lackawanna------	0-3	0.6-2.0	0.10-0.16	4.5-5.5	Low------------	0.24	3
	3-23	0.6-2.0	0.10-0.16	4.5-5.5	Low------------	0.28	
	23-80	0.06-0.2	0.01-0.06	4.5-6.0	Low------------	0.28	
Swartswood------	0-4	0.6-2.0	0.08-0.12	3.6-5.5	Low------------	0.20	3
	4-29	0.6-2.0	0.08-0.12	3.6-5.5	Low------------	0.28	
	29-60	0.06-0.6	0.01-0.06	3.6-5.5	Low------------	0.28	
Lm------------- Lamson	0-10	2.0-6.0	0.12-0.16	5.6-7.3	Low------------	---	---
	10-32	2.0-6.0	0.11-0.13	6.1-7.8	Low------------	---	
	32-50	2.0-6.0	0.02-0.04	6.6-7.8	Low------------	---	
LnB------------- Lordstown	0-8	0.6-2.0	0.11-0.17	4.5-5.5	Low------------	0.20	3
	8-34	0.6-2.0	0.10-0.16	4.5-5.5	Low------------	0.28	
	34	---	---	---	---------------	---	
[1]LOC:							
Lordstown-------	0-4	0.6-2.0	0.11-0.17	4.5-5.5	Low------------	0.20	3
	4-32	0.6-2.0	0.10-0.16	4.5-5.5	Low------------	0.28	
	32	---	---	---	---------------	---	
Arnot-----------	0-3	0.6-2.0	0.10-0.15	3.6-6.0	Low------------	0.24	2-1
	3-17	0.6-2.0	0.08-0.12	3.6-6.0	Low------------	0.17	
	17	---	---	---	---------------	---	
Rock outcrop.	---	---	---	---	---------------	---	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
[1]LY:							
Lyons	0-9	0.6-2.0	0.11-0.16	5.6-7.3	Low	---	---
	9-32	0.2-2.0	0.08-0.18	6.1-7.8	Low	---	
	32-50	<0.2	0.06-0.15	7.4-8.4	Low	---	
Atherton	0-7	0.6-2.0	0.16-0.21	5.1-7.3	Low	---	---
	7-28	0.6-2.0	0.10-0.19	5.6-7.8	Low	---	
	28-65	0.6-6.0	0.05-0.12	6.1-7.8	Low	---	
Ma Madalin	0-8	0.2-0.6	0.16-0.21	5.6-7.4	Moderate	---	---
	8-45	0.06-0.2	0.12-0.13	5.6-7.8	Moderate	---	
	45-50	<0.2	0.12-0.13	7.4-7.8	Moderate	---	
MdB Mardin	0-10	0.6-2.0	0.11-0.17	4.5-6.0	Low	0.24	3
	10-21	0.6-2.0	0.09-0.16	4.5-6.0	Low	0.28	
	21-46	<0.2	0.01-0.03	4.5-6.5	Low	0.28	
	46-56	<0.2	0.01-0.03	5.1-8.4	Low	0.28	
[1]MgB:							
Mardin	0-10	0.6-2.0	0.11-0.17	4.5-6.0	Low	0.24	3
	10-21	0.6-2.0	0.09-0.16	4.5-6.0	Low	0.28	
	21-48	<0.2	0.01-0.03	4.5-6.5	Low	0.28	
	48	---	---	---	---	---	
Nassau	0-6	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.20	2
	6-16	0.6-2.0	0.07-0.12	4.5-5.5	Low	0.20	
	16	---	---	---	---	---	
Mn Menlo	0-13	0.6-2.0	0.12-0.21	3.6-6.0	Low	0.24	3
	13-60	<0.2	0.08-0.12	5.0-6.0	Low	0.17	
MO Menlo	0-13	0.6-2.0	0.12-0.20	3.6-6.0	Low	0.17	3
	13-50	<0.2	0.08-0.12	5.1-6.5	Low	0.17	
Mr Middlebury	0-8	0.6-2.0	0.14-0.21	5.1-6.5	Low	---	---
	8-52	0.6-2.0	0.10-0.20	5.6-7.3	Low	---	
[1]MTB:							
Morris	0-18	0.6-2.0	0.10-0.16	4.5-6.0	Low	0.24	3
	18-60	0.06-0.6	0.06-0.08	5.1-6.5	Low	0.28	
Tuller	0-7	0.6-2.0	0.07-0.17	4.5-6.0	Low	0.24	2
	7-18	0.06-0.6	0.06-0.10	4.5-6.0	Low	0.17	
	18	---	---	---	---	---	
[1]NBF:							
Nassau	0-3	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.20	2
	3-16	0.6-2.0	0.07-0.12	4.5-5.5	Low	0.20	
	16	---	---	---	---	---	
Bath	0-4	0.6-2.0	0.10-0.20	4.5-6.0	Low	0.24	3
	4-26	0.6-2.0	0.08-0.18	4.5-6.0	Low	0.28	
	26-48	<0.2	0.01-0.06	4.5-6.0	Low	0.28	
	48	---	---	---	---	---	
Rock outcrop.							
[1]NMC, [1]NNF:							
Nassau	0-6	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.20	2
	6-16	0.6-2.0	0.07-0.12	4.5-5.5	Low	0.20	
	16	---	---	---	---	---	
Manlius	0-15	0.6-2.0	0.10-0.18	3.6-5.5	Low	0.28	2
	15-32	0.6-2.0	0.08-0.12	3.6-5.5	Low	0.20	
	32	---	---	---	---	---	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH			
[1]NOD:							
Nassau	0-6	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.20	2
	6-16	0.6-2.0	0.07-0.12	4.5-5.5	Low	0.20	
	16	---	---	---	---	---	
Rock outcrop.							
OdA, OdB: Odessa	0-8	0.2-0.6	0.17-0.21	5.6-7.3	Moderate	0.49	3
	8-38	<0.2	0.12-0.17	5.6-7.8	Moderate	0.28	
	38-50	<0.06	0.12-0.14	7.4-8.4	Moderate	0.28	
OgB: Oquaga	0-7	0.6-2.0	0.08-0.17	3.6-6.0	Low	0.24	3
	7-32	0.6-2.0	0.04-0.12	3.6-6.0	Low	0.20	
	32	---	---	---	---	---	
[1]OlC:							
Oquaga	0-7	0.6-2.0	0.08-0.17	3.6-6.0	Low	0.24	3
	7-32	0.6-2.0	0.04-0.12	3.6-6.0	Low	0.20	
	32	---	---	---	---	---	
Lordstown	0-8	0.6-2.0	0.11-0.17	4.5-5.5	Low	0.20	3
	8-32	0.6-2.0	0.10-0.16	4.5-5.5	Low	0.28	
	32	---	---	---	---	---	
[1]ORC, [1]ORD:							
Oquaga	0-5	0.6-2.0	0.08-0.17	3.6-6.0	Low	0.24	3
	5-32	0.6-2.0	0.04-0.12	3.6-6.0	Low	0.20	
	32	---	---	---	---	---	
Arnot	0-3	0.6-2.0	0.10-0.15	3.6-6.0	Low	0.24	2-1
	3-17	0.6-2.0	0.08-0.12	3.6-6.0	Low	0.17	
	17	---	---	---	---	---	
Rock outcrop.							
Pa: Palms	0-44	2.0-20	0.35-0.45	4.5-7.3	---	---	---
	44-56	0.2-2.0	0.14-0.22	6.1-8.4	Low	---	
Pb: Palms bedrock Variant	0-30	2.0-20	0.35-0.45	4.5-7.3	---	---	---
	30-38	0.6-2.0	0.04-0.17	6.1-7.3	Low	0.28	
	38	---	---	---	---	---	
PlB, PlC: Plainfield	0-9	2.0-6.0	0.10-0.12	4.5-7.3	Low	0.17	5
	9-65	6.0-20	0.03-0.07	4.5-6.0	Low	0.17	
[1]PmD, [1]PmF:							
Plainfield	0-5	2.0-6.0	0.10-0.12	4.5-6.0	Low	0.17	5
	5-28	6.0-20	0.03-0.07	4.5-6.0	Low	0.17	
	28-65	6.0-20	0.05-0.07	4.5-6.0	Low	---	
Riverhead	0-6	2.0-6.0	0.16-0.18	4.5-5.5	Low	0.28	3
	6-23	2.0-6.0	0.09-0.13	4.5-5.5	Low	0.24	
	23-62	>20	0.02-0.04	4.5-7.3	Low	0.17	
[1]PrC:							
Plainfield	0-9	2.0-6.0	0.10-0.12	4.5-6.0	Low	0.17	5
	9-65	6.0-20	0.03-0.07	4.5-6.0	Low	0.17	
Rock outcrop.							
Pt: Pompton	0-9	0.6-6.0	0.14-0.18	4.5-5.5	Low	0.24	3
	9-29	0.6-6.0	0.12-0.16	4.5-5.5	Low	0.24	
	29-61	>6.0	0.05-0.10	4.5-5.5	Low	0.20	
Ra: Raynham	0-8	0.6-2.0	0.20-0.25	5.1-7.3	Low	0.49	3
	8-37	0.2-2.0	0.18-0.22	5.1-7.3	Low	0.64	
	37-56	0.06-0.2	0.18-0.22	5.6-7.8	Low	0.64	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH			
Re---------------- Red Hook	0-8 8-30 30-50	0.6-2.0 0.6-2.0 0.2-2.0	0.09-0.12 0.04-0.17 0.04-0.11	5.1-6.5 5.6-7.3 5.6-7.3	Low------------ Low------------ Low------------	0.20 0.20 0.20	3
RhA, RhB--------- Rhinebeck	0-8 8-35 35-50	0.2-0.6 0.06-0.2 0.06-0.2	0.16-0.21 0.12-0.14 0.12-0.14	5.1-7.3 5.1-7.8 7.4-7.8	Moderate------- Moderate------- Moderate-------	0.49 0.28 0.28	3
RvA, RvB, RvC---- Riverhead	0-8 8-26 26-62	2.0-6.0 2.0-6.0 >20	0.16-0.18 0.09-0.13 0.02-0.04	4.5-5.5 4.5-5.5 4.5-7.3	Low------------ Low------------ Low------------	0.28 0.24 0.17	3
[1]RXC, [1]RXE, [1]RXF: Rock outcrop.							
Arnot-----------	0-3 3-17 17	0.6-2.0 0.6-2.0 ---	0.10-0.15 0.08-0.12 ---	3.6-6.0 3.6-6.0 ---	Low------------ Low------------ ---------------	0.24 0.17 ---	2-1
SaB, SaC--------- Schoharie	0-10 10-36 36-50	0.2-0.6 <0.2 <0.2	0.17-0.21 0.12-0.17 0.12-0.14	5.6-7.3 5.6-7.8 7.4-8.4	Moderate------- Moderate------- Moderate-------	0.49 0.28 0.28	3
Sc---------------- Scio	0-10 10-47 47-55	0.6-2.0 0.6-2.0 0.06-20	0.18-0.21 0.17-0.20 0.02-0.19	4.5-6.0 4.5-6.0 5.1-7.8	Low------------ Low------------ Low------------	0.49 0.64 0.17	3
[1]SdB:							
Scriba-----------	0-13 13-50	0.6-2.0 0.06-0.2	0.08-0.16 0.00-0.04	3.6-6.5 5.1-7.3	Low------------ Low------------	0.24 0.24	3
Morris-----------	0-13 13-80	0.6-2.0 0.06-0.6	0.10-0.16 0.06-0.08	4.5-6.0 5.1-6.5	Low------------ Low------------	0.24 0.28	3
[1]SEB:							
Scriba-----------	0-13 13-50	0.6-2.0 0.06-0.2	0.10-0.16 0.00-0.04	3.6-6.5 5.1-7.3	Low------------ Low------------	0.24 0.24	3
Morris-----------	0-13 13-80	0.6-2.0 0.06-0.6	0.12-0.16 0.06-0.08	4.5-6.0 5.1-6.5	Low------------ Low------------	0.24 0.28	3
[1]SGB:							
Scriba-----------	0-13 13-50	0.6-2.0 0.06-0.2	0.10-0.16 0.00-0.04	3.6-6.6 5.1-7.3	Low------------ Low------------	0.24 0.24	3
Morris-----------	0-17 17-62	0.6-2.0 0.06-0.6	0.12-0.16 0.06-0.08	4.5-6.0 5.1-6.5	Low------------ Low------------	0.24 0.28	3
[1]SmB, [1]SmC:							
Stockbridge------	0-7 7-34 34-56 56	0.6-2.0 0.6-2.0 0.06-0.2 ---	0.11-0.28 0.08-0.24 0.10-0.14 ---	5.1-6.5 5.1-7.3 6.6-7.8 ---	Low------------ Low------------ Low------------ ---------------	0.24 0.43 0.17 ---	3
Farmington-------	0-7 7-15 15	0.6-2.0 0.6-2.0 ---	0.12-0.15 0.07-0.18 ---	5.1-6.5 5.6-7.8 ---	Low------------ Low------------ ---------------	0.28 0.28 ---	2

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
[1]STD:							
Stockbridge-----	0-5	0.6-2.0	0.11-0.28	5.1-6.5	Low-----------	0.28	3
	5-29	0.6-2.0	0.08-0.24	5.1-7.3	Low-----------	0.43	
	29-48	0.06-0.2	0.10-0.14	6.6-7.3	Low-----------	0.17	
	48	---	---	---	--------------	---	
Farmington------	0-5	0.6-2.0	0.12-0.15	5.1-6.5	Low-----------	0.28	2
	5-15	0.6-2.0	0.07-0.18	5.6-7.8	Low-----------	0.28	
	15	---	---	---	--------------	---	
Rock outcrop.							
Su--------------- Suncook	0-3	>6.0	0.07-0.15	4.5-6.5	Low-----------	---	---
	3-53	>6.0	0.01-0.13	4.5-6.5	Low-----------	---	
SwB, SwC--------- Swartswood	0-7	0.6-2.0	0.08-0.16	4.0-5.5	Low-----------	0.20	3
	7-29	0.6-2.0	0.08-0.12	4.0-5.5	Low-----------	0.28	
	29-60	0.06-0.6	0.01-0.06	4.0-5.5	Low-----------	0.28	
Te--------------- Teel	0-10	0.6-2.0	0.18-0.21	5.1-6.0	Low-----------	---	---
	10-38	0.6-2.0	0.17-0.19	5.6-7.3	Low-----------	---	
	38-50	0.6-2.0	0.12-0.19	6.1-7.8	Low-----------	---	
Tg--------------- Tioga	0-10	0.6-6.0	0.15-0.21	5.1-6.0	Low-----------	---	---
	10-34	0.6-6.0	0.07-0.20	5.1-7.3	Low-----------	---	
	34-65	2.0-20	0.04-0.11	6.1-7.8	Low-----------	---	
TkA, TkB, TkC---- Tunkhannock	0-7	2.0-6.0	0.08-0.15	3.6-6.0	Low-----------	0.20	3
	7-30	2.0-6.0	0.08-0.12	3.6-6.0	Low-----------	0.28	
	30-80	2.0-20	0.01-0.08	3.6-6.0	Low-----------	0.17	
TuB, TuC, TuD---- Tunkhannock	0-7	2.0-6.0	0.08-0.15	4.5-5.5	Low-----------	0.20	3
	7-30	2.0-6.0	0.08-0.12	4.5-5.5	Low-----------	0.28	
	30-42	2.0-20	0.01-0.08	4.5-5.5	Low-----------	0.17	
	42-80	<0.06	0.12-0.14	7.9-8.4	Moderate-------	0.28	
Un--------------- Unadilla	0-10	0.6-2.0	0.18-0.21	5.6-7.3	Low-----------	0.49	3
	10-60	0.6-2.0	0.17-0.20	5.6-7.3	Low-----------	0.64	
	42-50	0.06-20	0.02-0.19	5.1-7.8	Low-----------	0.64	
[1]VAB, [1]VAD------- Valois	0-2	0.6-2.0	0.12-0.21	4.5-5.5	Low-----------	0.24	3
	2-40	0.6-2.0	0.07-0.14	4.5-6.0	Low-----------	0.28	
	40-65	0.6-6.0	0.03-0.09	5.1-7.3	Low-----------	0.28	
VoA, VoB, VoC---- Volusia	0-8	0.6-2.0	0.09-0.14	4.5-5.5	Low-----------	0.24	3
	8-19	0.6-2.0	0.09-0.16	4.5-6.0	Low-----------	0.28	
	19-70	0.6-0.2	0.01-0.02	5.1-7.8	Low-----------	0.28	
[1]VSB------------ Volusia	0-6	0.6-2.0	0.14-0.19	4.5-5.5	Low-----------	0.24	3
	6-19	0.6-2.0	0.09-0.16	4.5-6.0	Low-----------	0.28	
	19-70	0.6-0.2	0.01-0.02	5.1-7.8	Low-----------	0.28	
Wa--------------- Walpole	0-10	2.0-6.0	0.10-0.23	4.5-6.0	Low-----------	0.20	3
	10-27	2.0-6.0	0.07-0.18	4.5-6.0	Low-----------	0.28	
	27-60	>6.0	0.01-0.13	4.5-6.0	Low-----------	0.17	
Wb, Wc----------- Wayland	0-8	0.2-2.0	0.17-0.22	5.1-7.3	Low-----------	---	---
	8-26	0.06-0.2	0.16-0.20	5.1-7.8	Low-----------	---	
	26-50	0.06-0.2	0.08-0.19	5.6-7.8	Low-----------	---	
WeB, WeC--------- Wellsboro	0-9	0.6-2.0	0.10-0.14	4.5-6.0	Low-----------	0.20	3
	9-21	0.6-2.0	0.10-0.14	4.5-6.0	Low-----------	0.28	
	21-60	0.06-0.2	0.01-0.06	4.5-6.0	Low-----------	0.28	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
[1]WLB:							
Wellsboro--------	0-9	0.6-2.0	0.10-0.16	4.5-6.0	Low------------	0.20	3
	9-21	0.6-2.0	0.10-0.14	4.5-6.0	Low------------	0.28	
	21-50	0.06-0.2	0.01-0.06	4.5-6.0	Low------------	0.28	
Wurtsboro--------	0-6	0.6-2.0	0.10-0.16	3.6-6.0	Low------------	0.24	3
	6-19	0.6-2.0	0.10-0.14	3.6-6.0	Low------------	0.28	
	19-56	0.06-0.2	0.01-0.06	3.6-6.0	Low------------	---	
[1]WOB:							
Wellsboro--------	0-7	0.6-2.0	0.10-0.16	4.5-6.0	Low------------	0.20	3
	7-21	0.6-2.0	0.10-0.14	4.5-6.0	Low------------	0.28	
	21-60	0.06-0.2	0.01-0.06	4.5-6.0	Low------------	0.28	
Wurtsboro--------	0-6	0.6-2.0	0.10-0.16	3.6-6.0	Low------------	0.24	3
	6-19	0.6-2.0	0.10-0.14	3.6-6.0	Low------------	0.28	
	19-56	0.06-0.2	0.01-0.06	3.6-6.0	Low------------	---	
WsA, WsB---------- Williamson	0-8	0.6-2.0	0.18-0.20	4.5-6.0	Low------------	0.49	3
	8-18	0.6-2.0	0.18-0.20	4.5-6.5	Low------------	0.64	
	18-42	0.06-0.2	0.10-0.14	5.1-6.0	Low------------	0.64	
	42-52	0.06-0.2	0.10-0.14	5.1-7.3	Low------------	0.43	
WuB--------------- Wurtsboro	0-6	0.6-2.0	0.10-0.17	4.5-6.0	Low------------	0.24	3
	6-19	0.6-2.0	0.10-0.14	4.5-6.0	Low------------	0.28	
	19-56	0.06-0.2	0.01-0.06	4.5-6.0	Low------------	0.28	

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 16.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." The symbol > means more than. Absence of an entry indicates that the feature is not a concern. Areas of Alluvial land and Fresh water marsh are too variable to be estimated]

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness[1]	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
AA. Alluvial land												
AcB: Arnot	C/D	None	---	---	1.0-1.5	Perched	Apr-May	10-20	Hard	Moderate	Low	High.
[2]ARD:												
Arnot	C/D	None	---	---	1.0-1.5	Perched	Apr-May	10-20	Hard	Moderate	Low	High.
Lordstown	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Low	High.
Rock outcrop.												
[2]ARF:												
Arnot	C/D	None	---	---	1.0-1.5	Perched	Apr-May	10-20	Hard	Moderate	Low	High.
Oquaga	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Low	High.
Rock outcrop.												
At: Atherton	B/D	None	---	---	0-0.5	Apparent	Nov-Jun	>60	---	High	High	Low.
Ba: Barbour	B	Occasional	Brief	Dec-Apr	3.0-6.0	Apparent	Nov-Apr	>60	---	Moderate	Low	Moderate.
Be: Basher	B	Occasional	Brief	Dec-Apr	0.5-2.0	Apparent	Nov-May	>60	---	High	Moderate	Moderate.
BgC, BgD: Bath	C	None	---	---	2.0-4.0	Perched	Nov-Mar	>60	---	Moderate	Moderate	Moderate.
[2]BHE: Bath	C	None	---	---	2.0-4.0	Perched	Nov-Mar	>60	---	Moderate	Moderate	Moderate.
[2]BnC:												
Bath	C	None	---	---	2.0-4.0	Perched	Nov-Mar	40	Hard	Moderate	Moderate	Moderate.
Nassau	C	None	---	---	>6.0	---	---	10-20	Rippable	Moderate	Low	High.
[2]BOD:												
Bath	C	None	---	---	2.0-4.0	Perched	Nov-Mar	40	Hard	Moderate	Moderate	Moderate.
Nassau	C	None	---	---	>6.0	---	---	10-20	Rippable	Moderate	Low	High.
Rock outcrop.												
[2]BRC:												
Bath	C	None	---	---	20-40	Perched	Nov-Mar	>60	---	Moderate	Moderate	Moderate.

See footnotes at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness[1]		Uncoated steel	Concrete
					Ft			In				
[2]BRC:												
Mardin	C	None	---	---	1.5-2.0	Perched	Nov-Apr	>60	---	Moderate	Moderate	Moderate.
CaB, CaC Cambridge	C	None	---	---	2.0-3.0	Perched	Jan-Apr	>60	---	High	Moderate	Moderate.
Cc, Cd Canandaigua	D	Rare	---	---	0-1.0	Apparent	Nov-May	>60	---	High	High	Low.
Ce Carlisle	A/D	Frequent	Long	Nov-May	0-1.0	Apparent	Sep-Jun	>60	---	High	High	Low.
CgA, CgB Castile	B	None	---	---	1.5-2.0	Apparent	Mar-May	>60	---	Moderate	Moderate	Moderate.
CkB, CkC Cayuga	C	None	---	---	1.5-3.0	Perched	Apr-May	>60	---	Moderate	High	Low.
CnA, CnB, CnC Chenango	A	None	---	---	>6.0	---	---	>60	---	Moderate	Low	Moderate.
CvA, CvB Churchville	D	None	---	---	0.5-1.5	Perched	Dec-May	>60	---	Moderate	High	Low.
[2]FAE:												
Farmington	C	None	---	---	>6.0	---	---	10-20	Hard	Moderate	Low	Moderate.
Rock outcrop.												
FW. Fresh water marsh												
Ha Hamlin	B	Common	Brief	Dec-Apr	3.0-6.0	Apparent	Nov-May	>60	---	High	Low	Low.
He Haven	B	Rare	---	---	4.0-8.0	Apparent	Mar-Apr	>60	---	Moderate	Low	High.
HfA, HgA, HgB, HgC, HgD, [2]HSF Hoosic	A	None	---	---	>6.0	---	---	>60	---	Low	Low	High.
HuB, HuC Hudson	C	None	---	---	1.5-3.0	Perched	Feb-Apr	>60	---	High	High	Low.
[2]HvC3, [2]HwD, [2]HXE:												
Hudson	C	None	---	---	1.5-3.0	Perched	Feb-Apr	>60	---	High	High	Low.
Schoharie	C	None	---	---	1.5-3.0	Perched	Feb-Apr	>60	---	Moderate	High	Low.
LaB, LaC Lackawanna	C	None	---	---	2.0-4.0	Perched	Nov-Mar	>60	---	Moderate	Low	Moderate.

See footnotes at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness[1]		Uncoated steel	Concrete
					Ft			In				
[2]LCD, [2]LCF, [2]LEE:												
Lackawanna	C	None	---	---	2.0-4.0	Perched	Nov-Mar	>60	---	Moderate	Low	Moderate.
Swartswood	C	None	---	---	2.0-4.0	Perched	Nov-Mar	>60	---	Moderate	Low	High.
Lm Lamson	D	None	---	---	0-0.5	Apparent	Dec-May	>60	---	High	High	Low.
LnB Lordstown	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Low	High.
[2]LOC:												
Lordstown	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Low	High.
Arnot	C/D	None	---	---	1.0-1.5	Perched	Apr-May	10-20	Hard	Moderate	Low	High.
Rock outcrop.												
[2]LY:												
Lyons	D	None	---	---	0-0.5	Perched	Nov-Jun	>60	---	High	High	Low.
Atherton	B/D	None	---	---	0-0.5	Apparent	Nov-Jun	>60	---	High	High	Low.
Ma Madalin	D	None	---	---	0-0.5	Perched	Dec-May	>60	---	Moderate	High	Low.
MdB Mardin	C	None	---	---	1.5-2.0	Perched	Nov-Apr	>60	---	Moderate	Moderate	Moderate.
[2]MgB:												
Mardin	C	None	---	---	1.5-2.0	Perched	Nov-Apr	40	Hard	Moderate	Moderate	Moderate.
Nassau	C	None	---	---	>6.0	---	---	10-20	Rippable	Moderate	Low	High.
Mn, MO Menlo	D	None	---	---	0.0-0.5	Perched	Nov-Apr	>60	---	High	High	High.
Mr Middlebury	B	Common	Brief	Dec-May	0.5-2.0	Apparent	Jan-May	>60	---	High	Moderate	Moderate.
[2]MTB:												
Morris	C	None	---	---	0.5-1.5	Perched	Nov-May	>60	---	High	High	Moderate.
Tuller	D	None	---	---	0.5-1.0	Perched	Dec-Jun	10-20	Hard	High	High	Moderate.
[2]NBF:												
Nassau	C	None	---	---	>6.0	---	---	10-20	Rippable	Low	Low	High.
Bath	C	None	---	---	2.0-4.0	Perched	Nov-Mar	>40	Hard	Moderate	Moderate	Moderate.
Rock outcrop.												
[2]NMC, [2]NNF:												
Nassau	C	None	---	---	>6.0	---	---	10-20	Rippable	Moderate	Low	High.

See footnotes at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness[1]		Uncoated steel	Concrete
					Ft			In				
[2]NMC, [2]NNF:												
Manlius----------	C	None--------	---	---	>6.0	---	---	20-40	Rippable	Moderate	Low------	Moderate.
[2]NOD:												
Nassau-----------	C	None--------	---	---	>6.0	---	---	10-20	Rippable	Moderate	Low------	High.
Rock outcrop.												
OdA, OdB---------- Odessa	D	None--------	---	---	0.5-1.5	Perched	Dec-May	>60	---	Moderate	High-----	Low.
OgB--------------- Oquaga	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	High.
[2]OlC:												
Oquaga-----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	High.
Lordstown--------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.
[2]ORC, [2]ORD:												
Oquaga-----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	High.
Arnot------------	C/D	None--------	---	---	1.0-1.5	Perched	Apr-May	10-20	Hard	Moderate	Low------	High.
Rock outcrop.												
Pa---------------- Palms	A/D	Frequent----	Long------	Nov-May	0-1.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
Pb---------------- Palms bedrock Variant	A/D	Frequent----	Long------	Nov-May	0-1.0	Apparent	Nov-May	20-50	Hard	High-----	High-----	Moderate.
PlB, PlC---------- Plainfield	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
[2]PmD, [2]PmF:												
Plainfield-------	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
Riverhead--------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
[2]PrC:												
Plainfield-------	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
Rock outcrop.												
Pt---------------- Pompton	B	None--------	---	---	1.5-2.0	Apparent	Mar-May	>60	---	Moderate	Moderate	High.
Ra---------------- Raynham	C	None to rare	---	---	0.5-1.5	Apparent	Nov-Jun	>60	---	High-----	High-----	Moderate.
Re---------------- Red Hook	C	None--------	---	---	0.5-1.5	Apparent	Dec-May	>60	---	High-----	High-----	Moderate.

See footnotes at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness[1]		Uncoated steel	Concrete
					Ft			In				
RhA, RhB---------- Rhinebeck	D	None--------	---	---	0.5-1.5	Perched	Jan-May	>60	---	Moderate	High-----	Low.
RvA, RvB, RvC----- Riverhead	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
[2]RXC, [2]RXE, [2]RXF: Rock outcrop.												
Arnot------------	C/D	None--------	---	---	1.0-1.5	Perched	Apr-May	10-20	Hard	Moderate	Low------	High.
SaB, SaC---------- Schoharie	C	None--------	---	---	1.5-3.0	Perched	Feb-Apr	>60	---	Moderate	High-----	Low.
Sc---------------- Scio	B	None to rare	---	---	1.5-2.0	Apparent	Mar-May	>60	---	High-----	Moderate	Moderate.
[2]SdB: Scriba-----------	C	None--------	---	---	0.5-1.5	Perched	Nov-May	>60	---	High-----	Moderate	Moderate.
Morris-----------	C	None--------	---	---	0.5-1.5	Perched	Nov-May	>60	---	High-----	High-----	Moderate.
[2]SEB, [2]SGB: Scriba-----------	C	None--------	---	---	0.5-1.5	Perched	Nov-May	>60	---	High-----	Moderate	Moderate.
Morris-----------	C	None--------	---	---	0.5-1.5	Perched	Nov-May	>60	---	High-----	High-----	Moderate.
[2]SmB, [2]SmC: Stockbridge------	B	None--------	---	---	3.0-6.0	Perched	Dec-Apr	>40	Hard	Moderate	Moderate	Low.
Farmington-------	C	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low------	Moderate.
[2]STD: Stockbridge------	B	None--------	---	---	3.0-6.0	Perched	Dec-Apr	>40	Hard	Moderate	Moderate	Low.
Farmington-------	C	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low------	Moderate.
Rock outcrop.												
Su---------------- Suncook	A	Common------	Very brief or brief.	Jan-Apr	3.0-6.0	Apparent	Jan-Apr	>60	---	Low------	Low------	High.
SwB, SwC---------- Swartswood	C	None--------	---	---	2.0-4.0	Perched	Nov-Mar	>60	---	Moderate	Low------	High.
Te---------------- Teel	B	Common------	Brief-----	Nov-May	0.5-2.0	Apparent	Jan-May	>60	---	High-----	Moderate	Low.
Tg---------------- Tioga	B	Common------	Very brief or brief.	Jan-Apr	3.0-6.0	Apparent	Jan-Apr	>60	---	Moderate	Low------	Moderate.
TkA, TkB, TkC----- Tunkhannock	A	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.

See footnotes at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness[1]		Uncoated steel	Concrete
					Ft			In				
TuB, TuC, TuD----- Tunkhannock	A	None--------	---	---	2.5-3.5	Perched	Mar-May	>60	---	Moderate	Low------	High.
Un---------------- Unadilla	B	None to rare	---	---	>6.0	---	---	>60	---	High-----	Low------	Low.
[2]VAB, [2]VAD-------- Valois	B	None--------	---	---	3.0-6.0	Perched	Feb-Apr	>60	---	Moderate	Low------	High.
VoA, VoB, VoC, [2]VSB-------------- Volusia	C	None--------	---	---	0.5-1.5	Perched	Dec-May	>60	---	High-----	High-----	Moderate.
Wa---------------- Walpole	C	None--------	---	---	0.5-1.5	Apparent	Dec-Apr	>60	---	Moderate	Moderate	High.
Wb, Wc------------ Wayland	D	Frequent----	Brief to long.	Nov-May	0.0-0.5	Apparent	Nov-Jun	>60	---	High-----	High-----	Low.
WeB, WeC---------- Wellsboro	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	Moderate	Moderate.
[2]WLB, [2]WOB:												
Wellsboro--------	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	Moderate	Moderate.
Wurtsboro--------	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	Moderate	High.
WsA, WsB---------- Williamson	C	None--------	---	---	1.5-2.0	Perched	Feb-Apr	>60	---	High-----	Moderate	Moderate.
WuB--------------- Wurtsboro	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	Moderate	High.

[1] In some areas where soils are underlain by hard bedrock, shallow excavations can be made by ripping. Blasting is generally required in deep bedrock excavations.

[2] This map unit is made up of two or more dominant kinds of soil. See description of the map unit for composition and behavior characteristics of the whole map unit.

TABLE 17.--ENGINEERING TEST DATA

[Absence of an entry indicates that data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution											Liquid limit	Plasticity index	Moisture density		Linear shrinkage
			Larger than 3 inches	Percentage passing sieve							Percentage smaller than--							
	AASHTO	Unified		2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture	
			Pct											Pct		Lb/ft3	Pct	Pct
Bath gravelly silt loam:[1] (S72NY-056-007)																		
Ap------- 0 to 6	A-4 (01)	SM	10	100	94	89	84	77	64	50	24	7	3	40	5	93	24	4.8
B21------ 6 to 11	A-4 (00)	SM	10	100	96	92	87	79	66	49	26	14	6	23	3	114	15	2.4
B22------11 to 24	A-4 (00)	SM-SC	10	97	91	87	82	73	60	44	24	13	8	23	5	122	12	4.0
B23------24 to 28	A-4 (00)	SM-SC	10	100	91	85	78	68	54	38	22	12	7	20	4	121	12	3.0
Bx-------28 to 55	A-2-4(00)	SM	15	91	81	75	70	63	51	33	16	9	5	18	3	129	9	3.2
C--------55 to 65	A-4 (00)	SM	15	99	94	90	88	85	79	42	20	10	7	17	1	124	11	1.6
Cambridge gravelly silt loam:[2] (S72NY-056-005)																		
Ap------- 0 to 6	A-4 (03)	ML	5	100	95	89	83	75	64	54	35	16	7	37	8	108	16	5.8
B2------- 6 to 20	A-4 (00)	SC	5	98	88	81	73	62	48	37	25	14	9	25	8	120	13	4.4
A'2------20 to 23	A-2-4(00)	SM-SC	5	100	89	92	75	64	45	33	14	9	--	24	7	121	12	5.0
B'xt-----23 to 64	A-4 (01)	SC	5	95	89	84	78	69	57	43	26	17	11	26	9	121	12	5.6
Haven loam:[3] (S72NY-056-008)																		
Ap------- 0 to 11	A-4 (00)	ML	0	100	100	100	99	97	90	60	27	15	15	24	3	109	16	3.6
B21------11 to 22	A-4 (00)	CL-ML	0	100	98	95	92	87	77	53	28	16	16	23	4	123	12	3.8
IIIC-----25 to 60	A-1-b(01)	SW	0	100	96	88	77	57	17	2	1	1	--	--	NP	120	10	0.4
Hudson silt loam:[4] (S72NY-056-004)																		
Ap------- 0 to 7	A-7-5(11)	ML	0	100	98	97	96	94	87	73	56	28	12	45	14	95	24	6.8
A2------- 7 to 15	A-6 (14)	CL	0	100	100	100	100	99	94	88	74	47	28	38	16	100	23	3.0
B&A------15 to 25	A-7-6(17)	CL	0	100	100	100	99	98	95	92	80	57	37	42	17	99	24	8.0
B2t------25 to 38	A-7-6(25)	CL	0	100	100	100	100	100	99	98	88	67	45	49	22	99	23	9.6
C--------38 to 60	A-6 (18)	CL	0	100	100	100	99	98	97	95	88	59	38	39	18	105	21	0.0

See footnotes at end of table.

TABLE 17.--ENGINEERING TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution											Liquid limit	Plasticity index	Moisture density		Linear shrinkage
			Larger than 3 inches	Percentage passing sieve							Percentage smaller than--							
	AASHTO	Unified		2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture	
			Pct											Pct		Lb/ft3	Pct	Pct
Plainfield loamy sand:[5] (S72NY-056-009)																		
Ap------- 0 to 9	A-2-4(00)	SM	0	100	100	100	100	100	79	17	9	5	4	--	NP	113	13	0.0
B21------ 9 to 23	A-2-4(00)	SM	0	100	100	100	99	99	79	19	11	8	5	--	NP	118	10	0.0
B22------23 to 32	A-2-4(00)	SM	0	100	100	100	97	95	71	17	9	6	4	--	NP	117	10	0.0
IIC------32 to 65	A-3 (01)	SP	0	100	100	100	99	98	55	2	--	--	--	--	NP	102	15	0.0
Scriba gravelly fine sandy loam:[6] (S72NY-056-001)																		
Ap------- 0 to 9	A-2-4(00)	SM	10	84	73	72	71	70	57	27	14	6	4	--	NP	94	2	0.0
A2g------ 9 to 13	A-2-4(00)	SM	10	100	95	92	86	75	59	31	9	6	3	--	NP	121	11	1.8
Bx1------13 to 19	A-2-4(00)	SM	10	98	88	82	76	69	55	26	13	4	2	--	NP	130	8	0.0
Bx2------19 to 50	A-2-4(00)	SM	10	87	74	69	65	61	51	26	11	3	1	--	NP	129	8	0.0
Swartswood gravelly fine sandy loam:[7] (S72NY-056-003)																		
Ap------- 0 to 7	A-2-4(00)	SM	5	94	85	82	77	73	61	33	26	13	8	--	NP	105	14	3.4
B2------- 7 to 24	A-2-4(00)	SM	5	100	94	90	83	76	58	32	17	10	7	18	2	129	7	2.4
Bx-------29 to 60	A-2-4(00)	SM	15	98	92	87	80	74	57	30	17	10	7	15	2	131	7	2.0
Tioga fine sandy loam:[8] (S72NY-056-010)																		
Ap------- 0 to 10	A-4 (00)	SM	0	100	100	100	100	100	100	44	15	8	6	--	NP	112	14	0.4
B21------10 to 24	A-4 (00)	SM	0	100	100	100	100	100	100	44	16	8	5	--	NP	113	13	0.8
B22------24 to 34	A-4 (01)	CL-ML	0	100	100	100	100	100	100	77	29	12	7	22	4	110	15	4.0
C1-------34 to 40	A-4 (00)	SM	0	100	100	100	100	100	100	41	16	7	4	--	NP	113	13	1.2
C2-------40 to 53	A-4 (00)	SM	0	100	100	100	100	100	100	37	29	12	7	20	2	110	15	2.0
C3-------53 to 65	A-4 (00)	SM	0	100	100	100	100	100	100	44	15	7	4	--	NP	111	15	0.6
Unadilla silt loam:[9] (S72NY-056-011)																		
Ap------- 0 to 10	A-4 (07)	ML	0	100	100	100	100	100	99	96	63	27	14	33	6	98	23	5.0
B21------10 to 17	A-4 (08)	CL	0	100	100	100	100	100	100	90	32	19	--	32	9	101	22	4.0
B22------17 to 40	A-4 (10)	CL	0	100	100	100	100	100	100	100	71	31	18	32	10	102	21	6.0
C--------40 to 60	A-4 (02)	CL-ML	0	100	100	100	100	100	100	87	49	22	13	23	5	112	14	2.0

See footnotes at end of table.

TABLE 17.--ENGINEERING TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution											Liquid limit	Plasticity index	Moisture density		Linear shrinkage
			Larger than 3 inches	Percentage passing sieve							Percentage smaller than--							
	AASHTO	Unified		2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture	
			Pct											Pct		Lb/ft	Pct	Pct
Wayland mucky silt loam:[10] ('S72NY-056-006)																		
Ap1------ 0 to 10	A-5 (09)	ML	0	100	100	100	100	100	99	99	--	--	--	48	2	70	39	5.6
Ap2------10 to 17	A-4 (10)	ML	0	100	100	100	100	100	100	99	--	--	--	39	7	89	29	5.6
B2g------17 to 26	A-4 (03)	CL-ML	0	100	100	100	100	100	100	97	64	33	20	24	5	106	19	4.0
Cg-------26 to 60	A-4 (04)	CL-ML	0	100	100	100	100	100	100	98	61	30	19	23	6	110	17	4.0
Wurtsboro gravelly loam:[11] (S72NY-056-002)																		
Ap------- 0 to 6	A-2-4(00)	GM	5	88	73	68	63	60	52	35	15	5	2	--	NP	98	21	5.2
B2------- 6 to 12	A-2-4(00)	SM	5	100	90	83	74	65	51	30	16	9	4	--	NP	120	12	1.0
A'2------12 to 19	A-4 (00)	SM	5	100	94	90	86	80	68	43	21	11	6	16	3	127	10	2.0
B'x------19 to 36	A-4 (00)	SM	5	94	87	82	75	69	58	37	20	12	6	15	3	132	9	2.0
C'x------36 to 56	A-4 (00)	SM	5	99	90	85	82	79	71	44	26	12	7	14	2	130	9	1.4

[1]Bath gravelly silt loam:
Town of New Paltz, 0.75 mile west-southwest of Clintondale, 820 feet west of US-44.
[2]Cambridge gravelly silt loam:
Town of New Paltz, 4 miles southwest of New Paltz, 0.5 mile southwest of Decker Road,738 feet west of Albany Road.
[3]Haven loam:
Town of New Paltz 115 feet west and 250 feet north of junction of Springtown Road and Dug Road.
[4]Hudson silt loam:
Town of Shawangunk, 100 feet south of Bates Lane and 0.8 mile east of Hogenburgh Road.
[5]Plainfield loamy sand:
Town of Rosendale, village of Tillson, 150 feet south of Orchard Road in sand pit along NY-32.
[6]Scriba gravelly fine sandy loam:
Town of Warwarsing, 4 miles west-southwest of Merriman Dam on Roundout Reservoir, 1,000 feet west of East South Road.
[7]Swartswood gravelly fine sandy loam:
Town of Shawangunk, 0.5 mile east of Walker Valley, 0.45 mile southeast of Weed Road,0.25 mile northeast of Rt-52.
[8]Tioga fine sandy loam:
Town of Hurley, 0.75 mile north of Hurley, 370 feet east of Esopus Creek.
[9]Unadilla silt loam:
Town of Ulster, 1 mile north of city of Kingston, 1,815 feet east of Esopus Creek.
[10]Wayland mucky silt loam:
Town of New Paltz, 1.25 miles southwest of New Paltz, 660 feet west of Plains Road.
[11]Wurtsboro gravelly loam:
Town of Warwarsing, 0.25 mile north of church at Ulster Heights,175 feet east of Pine View Bungalows.

TABLE 18.--RELATIONSHIP BETWEEN PARENT MATERIAL, POSITION, AND DRAINAGE OF SOIL SERIES

Parent material	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS ON TILL PLAINS AND MOUNTAINS					
Deep, dominantly medium textured, brownish glacial till with a compact fragipan.	---	Bath	Mardin	Volusia	---	---
Deep, dominantly moderately coarse textured, brownish glacial till with a compact fragipan.	---	Swartswood	Wurtsboro	Scriba	---	Menlo
Deep, dominantly medium textured, reddish glacial till with a compact fragipan.	---	Lackawanna	Wellsboro	Morris	---	---
Deep, medium textured, brownish glacial till with clay accumulation in a compact fragipan.	---	---	Cambridge	---	---	---
Deep, medium textured, brownish, medium lime glacial till.	---	Stockbridge	---	---	Lyons	Lyons
Deep, medium or moderately coarse textured, reddish to brownish, low lime glacial till.	---	Valois	---	---	---	---
Deep, dominantly moderately fine textured glacial till mantled with 20 to 40 inches of lacustrine clay and silt.	---	Cayuga	Cayuga	Churchville	---	---
Moderately deep, medium textured, brownish glacial till over sandstone.	---	Lordstown	---	---	---	---
Moderately deep, medium textured, reddish glacial till over sandstone.	Oquaga[1]	Oquaga	---	---	---	---
Moderately deep, medium textured, brownish glacial till over tilted shale.	Manlius[1]	Manlius	---	---	---	---
Shallow, medium textured, reddish on brownish glacial till over sandstone or shale.	Arnot	Arnot	Arnot	Tuller	Tuller	---
Shallow, medium textured, brownish glacial till over tilted shale.	Nassau	---	---	---	---	---
Shallow, medium textured, brownish glacial till over limestone.	Farmington	Farmington	---	---	---	---
	SOILS ON LACUSTRINE PLAINS AND TERRACES					
Clayey, brownish glaciolacustrine deposits.	---	---	Hudson	Rhinebeck	Madalin	Madalin
Clayey, reddish glaciolacustrine deposits.	---	Schoharie	Schoharie	Odessa	---	---
Silty, brownish glaciolacustrine deposits with a compact fragipan.	---	---	Williamson	---	---	---
Silty, brownish glaciolacustrine and glaciofluvial deposits without a fragipan.	---	Unadilla	Scio	Raynham	Canandaigua	Canandaigua

See footnotes at end of table.

TABLE 18.--RELATIONSHIP BETWEEN PARENT MATERIAL, POSITION, AND DRAINAGE OF SOIL SERIES--Continued

Parent material	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS ON OUTWASH PLAINS, DELTAS, TERRACES, AND KAMES					
Stratified gravel and sand, brownish, medium textured glaciofluvial material.	Chenango	Chenango	Castile	Red Hook	Atherton	Atherton
Stratified sand and gravel, reddish, medium or moderately coarse textured glaciofluvial material.	Tunkhannock	Tunkhannock	---	---	---	---
Stratified sand and gravel, brownish, moderately coarse textured glaciofluvial material.	Hoosic	---	---	---	---	---
Stratified sand and gravel, brownish, medium to moderately coarse textured glaciofluvial material with a thin mantle of nongravelly medium textured material.	---	Haven	---	---	---	---
Sand, brownish moderately coarse textured glaciofluvial material.	---	Riverhead	Pompton	Walpole	Lamson	Lamson
Sand, brownish coarse textured glaciofluvial material.	Plainfield[2]	---	---	---	---	---
	SOILS ON FLOOD PLAINS					
Loamy, brownish, medium and moderately coarse textured alluvial sediment.	---	Tioga	Middlebury	Middlebury	---	---
Silty, brownish, medium textured alluvial sediment.	---	Hamlin	Teel	Teel	Wayland	Wayland
Loamy, reddish, medium to moderately coarse textured alluvial sediment over sand and gravel.	---	Barbour	Basher	Basher	---	---
Sandy, brownish, coarse textured alluvial sediment.	Suncook[2]	---	---	---	---	---
	SOILS ON SWAMPS OR BOGS					
Deep, organic material more than 51 inches thick.	---	---	---	---	---	Carlisle
Moderately deep organic material, 16 to 50 inches thick, over loamy mineral soil.	---	---	---	---	---	Palms
Moderately deep organic material, 20 to 50 inches thick, over bedrock.	---	---	---	---	---	Palms, bedrock variant

[1]These soils are excessively drained in some places.
[2]These soils are excessively drained instead of somewhat excessively drained.

TABLE 19.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Arnot	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Atherton	Fine-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Barbour	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Fluventic Dystrochrepts
Basher	Coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts
Bath	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Cambridge	Fine-loamy, mixed, mesic Aqueptic Fragiudalfs
Canandaigua	Fine-silty, mixed, nonacid, mesic Mollic Haplaquepts
Carlisle	Euic, mesic Typic Medisaprists
Castile	Loamy-skeletal, mixed, mesic Aquic Dystrochrepts
Cayuga	Fine, illitic, mesic Glossoboric Hapludalfs
Chenango	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Churchville	Fine, illitic, mesic Aeric Ochraqualfs
Farmington	Loamy, mixed, mesic Lithic Eutrochrepts
Hamlin	Coarse-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Haven	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Typic Dystrochrepts
Hoosic	Sandy-skeletal, mixed, mesic Typic Dystrochrepts
Hudson	Fine, illitic, mesic Glossaquic Hapludalfs
Lackawanna	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Lamson	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Lordstown	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Lyons	Fine-loamy, mixed, nonacid, mesic Mollic Haplaquepts
Madalin	Fine, illitic, mesic Mollic Ochraqualfs
Manlius	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Mardin	Coarse-loamy, mixed, mesic Typic Fragiochrepts
*Menlo	Coarse-loamy, mixed, mesic Aeric Fragiaquepts
Middlebury	Coarse-loamy, mixed, mesic Fluvaquentic Eutrochrepts
Morris	Coarse-loamy, mixed, mesic Aeric Fragiaquepts
Nassau	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Odessa	Fine, illitic, mesic Aeric Ochraqualfs
Oquaga	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Palms	Loamy, mixed, euic, mesic Terric Medisaprists
Palms bedrock Variant	Euic, mesic Lithic Medisaprists
Plainfield	Mixed, mesic Typic Udipsamments
Pompton	Coarse-loamy, mixed, mesic Aquic Dystrochrepts
Raynham	Coarse-silty, mixed, nonacid, mesic Aeric Haplaquepts
Red Hook	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Rhinebeck	Fine, illitic, mesic Aeric Ochraqualfs
Riverhead	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Schoharie	Fine, illitic, mesic Typic Hapludalfs
Scio	Coarse-silty, mixed, mesic Aquic Dystrochrepts
Scriba	Coarse-loamy, mixed, mesic Aeric Fragiaquepts
Stockbridge	Coarse-loamy, mixed, mesic Dystric Eutrochrepts
Suncook	Mixed, mesic Typic Udipsamments
Swartswood	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Teel	Coarse-silty, mixed, mesic Fluvaquentic Eutrochrepts
Tioga	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Tuller	Loamy-skeletal, mixed, acid, mesic Lithic Haplaquepts
Tunkhannock	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
*Unadilla	Coarse-silty, mixed, mesic Typic Dystrochrepts
Valois	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Volusia	Fine-loamy, mixed, mesic Aeric Fragiaquepts
Walpole	Sandy, mixed, mesic Aeric Haplaquepts
Wayland	Fine-silty, mixed, nonacid, mesic Mollic Fluvaquents
Wellsboro	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Williamson	Coarse-silty, mixed, mesic Typic Fragiochrepts
Wurtsboro	Coarse-loamy, mixed, mesic Typic Fragiochrepts

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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
CORNELL UNIVERSITY
AGRICULTURAL EXPERIMENT STATION

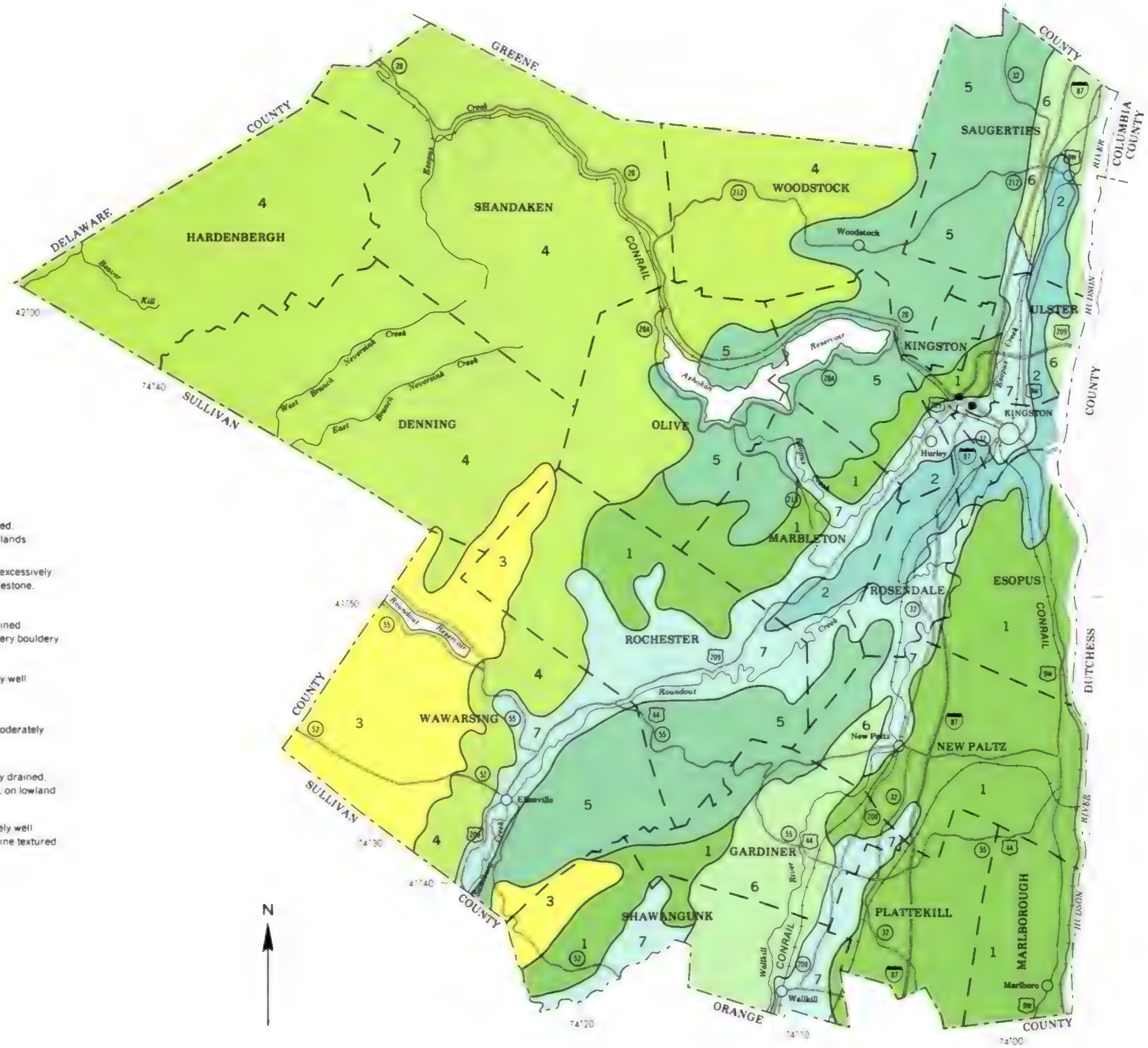
GENERAL SOIL MAP

ULSTER COUNTY, NEW YORK

Scale 1:316,800

1 0 1 2 3 4 5 Miles

1 0 1 2 3 4 5 Kilometers



SOIL ASSOCIATIONS

1	Bath-Nassau Deep and shallow, well drained and somewhat excessively drained, dominantly hilly, medium textured soils underlain dominantly with shale, on uplands
2	Stockbridge Farmington-Bath Deep and shallow, well drained and somewhat excessively drained, dominantly hilly, medium textured soils underlain dominantly with limestone, on uplands
3	Wellboro-Wurtsboro-Swartswood Deep, moderately well drained and well drained dominantly gently sloping, moderately coarse textured and medium textured, very bouldery soils, on uplands
4	Arnot-Oquaga Lackawanna Shallow to deep, excessively drained to moderately well drained, dominantly very steep, medium textured soils, on uplands
5	Lordstown-Arnot-Mardin Shallow to deep, somewhat excessively drained to moderately well drained, dominantly sloping, medium textured soils, on uplands
6	Churchville-Rhinebeck Madalin Deep, somewhat poorly drained to very poorly drained, dominantly gently sloping, medium textured and moderately fine textured soils, on lowland plains
7	Hoosic Schoharie-Chenango Deep somewhat excessively drained to moderately well drained, dominantly gently sloping moderately coarse textured to moderately fine textured soils, in valleys and on plains

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

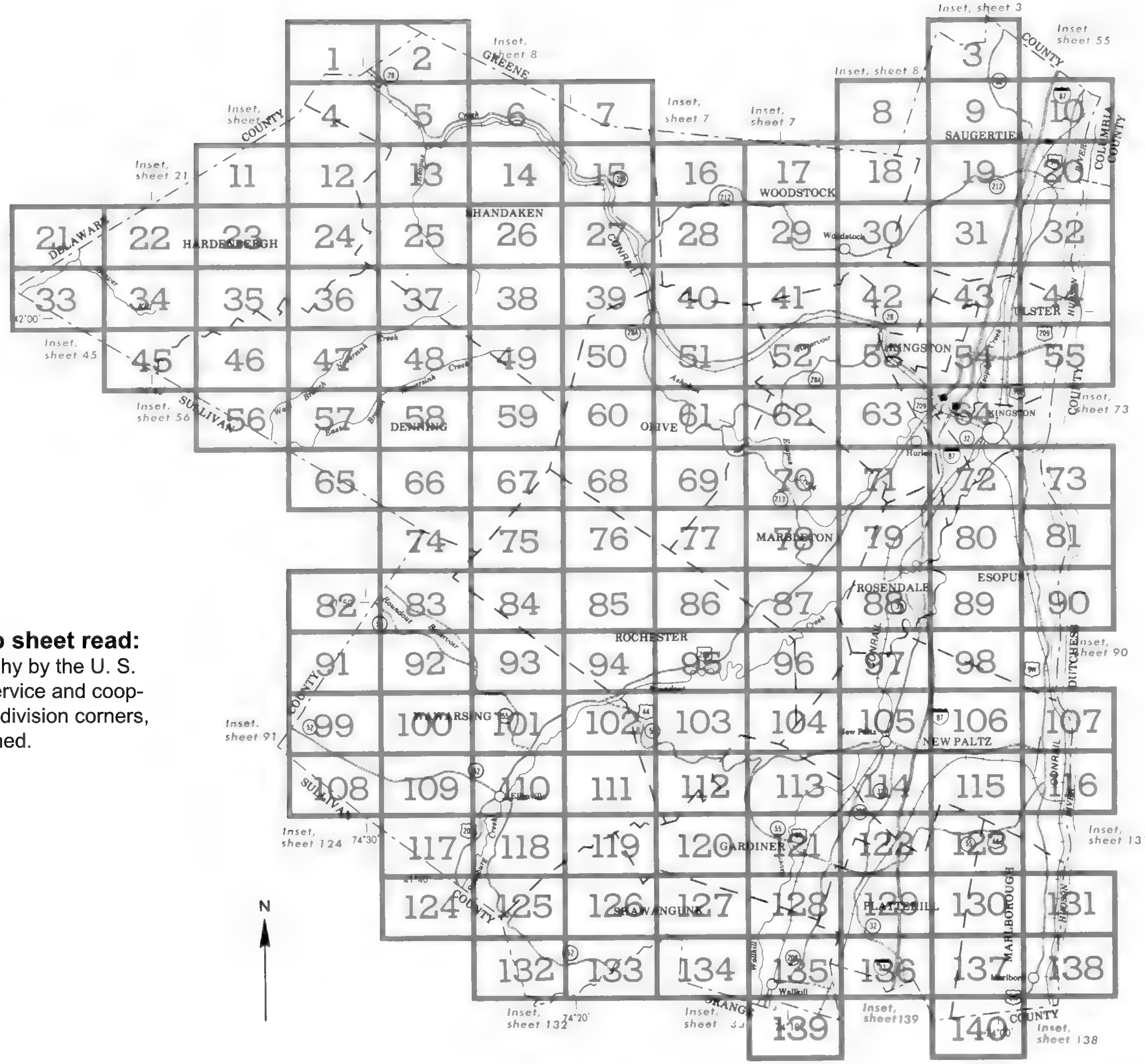
INDEX TO MAP SHEETS

ULSTER COUNTY, NEW YORK

Scale 1:316,800

1 0 1 2 3 4 5 Miles

1 0 1 2 3 4 5 Kilometers



N

Original text from each individual map sheet read:
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL LEGEND

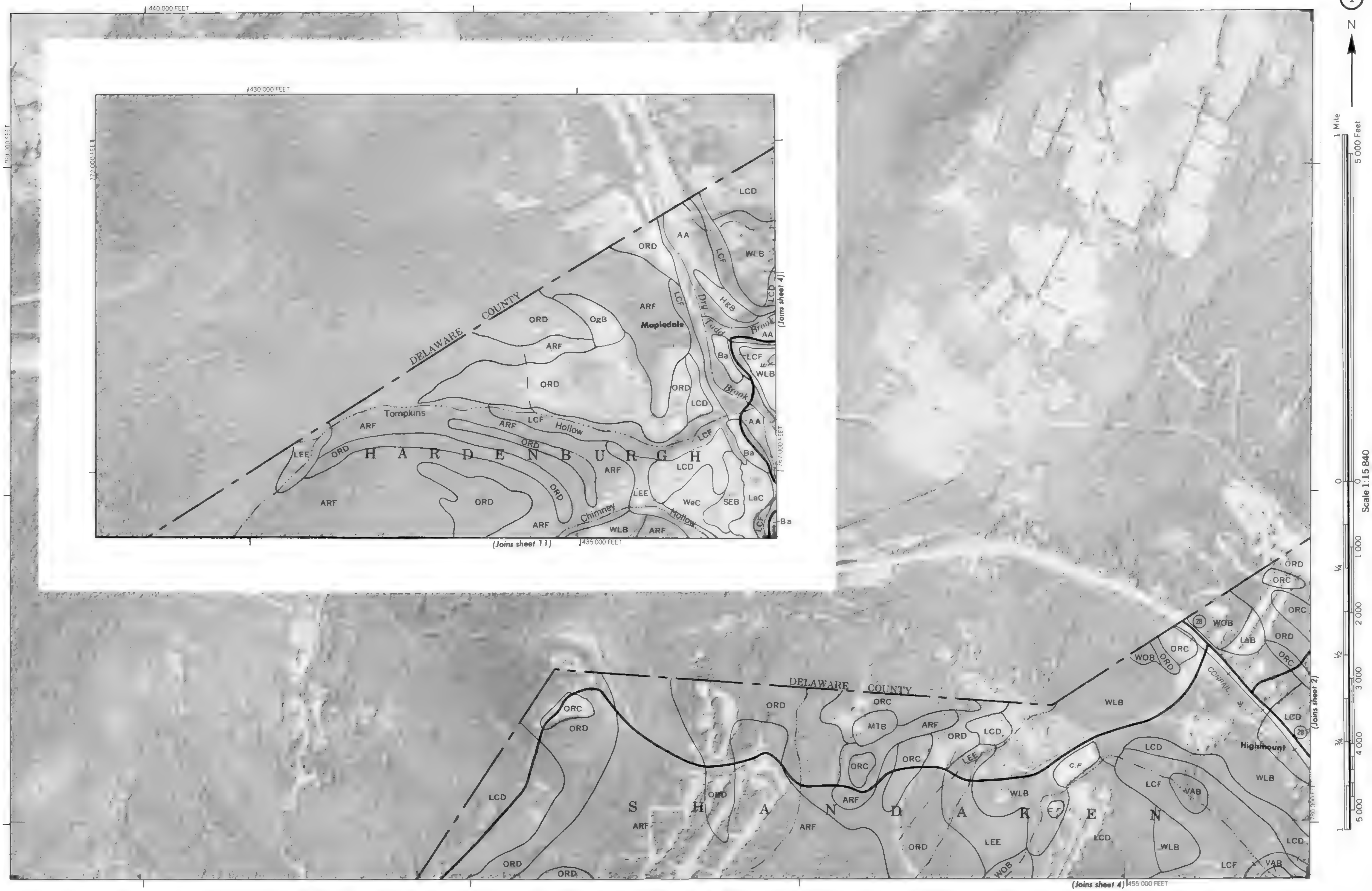
The first letter, always a capital, is the initial letter of the soil name. The second letter is a capital if the mapping unit is broadly defined; otherwise, it is a small letter. The third letter, always a capital, A, B, C, D, E, or F, shows the slope. Symbols without a slope letter are those of nearly level soils. A final number, 3, shows that the soil is severely eroded.

SYMBOL	NAME
AA	Alluvial Land *
AcB	Arnot channery silt loam, 0 to 8 percent slopes
ARD	Arnot-Lordstown-Rock outcrop complex, moderately steep *
ARF	Arnot-Oquaga-Rock outcrop complex, very steep *
At	Atherton silt loam
Ba	Barbour loam
Be	Basher silt loam
BgC	Bath gravelly silt loam, 8 to 15 percent slopes
BgD	Bath gravelly silt loam, 15 to 25 percent slopes
BHE	Bath very stony soils, steep *
BnC	Bath-Nassau complex, 8 to 25 percent slopes
BOD	Bath-Nassau-Rock outcrop complex, hilly *
BRC	Bath and Mardin very stony soils, sloping *
CaB	Cambridge gravelly silt loam, 3 to 8 percent slopes
CaC	Cambridge gravelly silt loam, 8 to 15 percent slopes
Cc	Canandaigua silt loam
Cd	Canandaigua silt loam, till substratum
Ce	Carlisle muck
CgA	Castile gravelly silt loam, 0 to 3 percent slopes
CgB	Castile gravelly silt loam, 3 to 8 percent slopes
CkB	Cayuga silt loam, 3 to 8 percent slopes
CkC	Cayuga silt loam, 8 to 15 percent slopes
CnA	Chenango gravelly silt loam, 0 to 3 percent slopes
CnB	Chenango gravelly silt loam, 3 to 8 percent slopes
CnC	Chenango gravelly silt loam, 8 to 15 percent slopes
CvA	Churchville silt loam, 0 to 3 percent slopes
CvB	Churchville silt loam, 3 to 8 percent slopes
FAE	Farmington-Rock outcrop complex, steep *
FW	Fresh water marsh *
Ha	Hamlin silt loam
He	Haven loam
HfA	Hoosic cobbly loam, 0 to 3 percent slopes
HgA	Hoosic gravelly loam, 0 to 3 percent slopes
HgB	Hoosic gravelly loam, 3 to 8 percent slopes
HgC	Hoosic gravelly loam, rolling
HgD	Hoosic gravelly loam, 15 to 25 percent slopes
HSF	Hoosic soils, very steep *
HuB	Hudson silt loam, 3 to 8 percent slopes
HuC	Hudson silt loam, 8 to 15 percent slopes
HvC3	Hudson and Schoharie silty clay loams, 8 to 15 percent slopes, severely eroded
HwD	Hudson and Schoharie soils, 15 to 25 percent slopes
HXE	Hudson and Schoharie soils, steep *

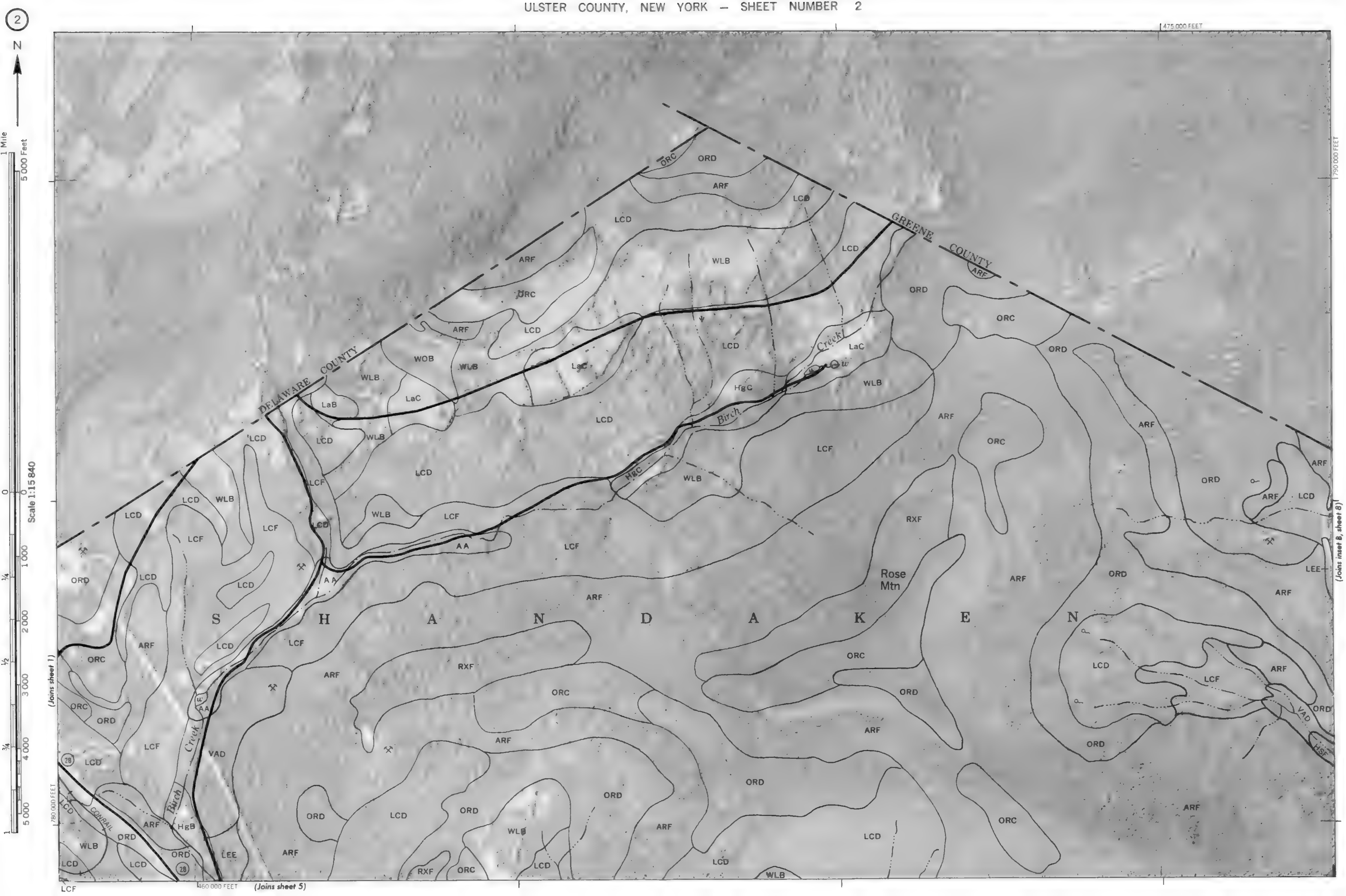
SYMBOL	NAME
LaB	Lackawanna flaggy silt loam, 3 to 8 percent slopes
LaC	Lackawanna flaggy silt loam, 8 to 15 percent slopes
LCD	Lackawanna and Swartswood very bouldery soils, moderately steep *
LCF	Lackawanna and Swartswood very bouldery soils, very steep *
LEE	Lackawanna and Swartswood extremely bouldery soils, steep *
Lm	Lamson fine sandy loam
LnB	Lordstown channery silt loam, 3 to 8 percent slopes
LOC	Lordstown-Arnot-Rock outcrop complex, sloping *
LY	Lyons-Atherton complex, very stony *
Ma	Madalin silty clay loam
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes
MgB	Mardin-Nassau complex, 3 to 8 percent slopes
Mn	Menlo silt loam
MO	Menlo very bouldery soils *
Mr	Middlebury silt loam
MTB	Morris-Tuller complex, very bouldery, gently sloping *
NBF	Nassau-Bath-Rock outcrop complex, very steep *
NMC	Nassau-Manlius shaly silt loams, rolling *
NNF	Nassau-Manlius complex, very steep *
NOD	Nassau-Rock outcrop complex, hilly *
OdA	Odessa silt loam, 0 to 3 percent slopes
OdB	Odessa silt loam, 3 to 8 percent slopes
OgB	Oquaga channery silt loam, 3 to 8 percent slopes
OIC	Oquaga and Lordstown channery silt loams, 8 to 15 percent slopes
ORC	Oquaga-Arnot-Rock outcrop complex, sloping *
ORD	Oquaga-Arnot-Rock outcrop complex, moderately steep *
Pa	Palms muck
Pb	Palms muck, bedrock variant
PlB	Plainfield loamy sand, 0 to 8 percent slopes
PlC	Plainfield loamy sand, 8 to 15 percent slopes
PmD	Plainfield-Riverhead complex, moderately steep
PmF	Plainfield-Riverhead complex, very steep
PrC	Plainfield-Rock outcrop complex, rolling
Pt	Pompton fine sandy loam
Ra	Raynham silt loam
Re	Red Hook gravelly silt loam
RhA	Rhinebeck silt loam, 0 to 3 percent slope
RhB	Rhinebeck silt loam, 3 to 8 percent slope
RvA	Riverhead fine sandy loam, 0 to 3 percent slopes
RvB	Riverhead fine sandy loam, 3 to 8 percent slopes
RvC	Riverhead fine sandy loam, 8 to 15 percent slopes
RXC	Rock outcrop-Arnot complex, sloping *
RXE	Rock outcrop-Arnot complex, steep *
RXF	Rock outcrop-Arnot complex, very steep *

SYMBOL	NAME
SaB	Schoharie silt loam, 3 to 8 percent slopes
SaC	Schoharie silt loam, 8 to 15 percent slopes
Sc	Scio silt loam
SdB	Scriba and Morris soils, 0 to 8 percent slopes
SEB	Scriba and Morris very bouldery soils, gently sloping *
SGB	Scriba and Morris extremely bouldery soils, gently sloping *
SmB	Stockbridge-Farmington gravelly silt loams, 3 to 8 percent slopes
SmC	Stockbridge-Farmington gravelly silt loams, 8 to 15 percent slopes
STD	Stockbridge-Farmington-Rock outcrop complex, hilly *
Su	Suncook loamy fine sand
SwB	Swartswood stony fine sandy loam, 3 to 8 percent slopes
SwC	Swartswood stony fine sandy loam, 8 to 15 percent slopes
Te	Teel silt loam
Tg	Tioga fine sandy loam
TkA	Tunkhannock gravelly loam, 0 to 3 percent slopes
TkB	Tunkhannock gravelly loam, 3 to 8 percent slopes
TkC	Tunkhannock gravelly loam, rolling
TuB	Tunkhannock gravelly loam, clayey substratum, 3 to 8 percent slopes
TuC	Tunkhannock gravelly loam, clayey substratum, 8 to 15 percent slopes
TuD	Tunkhannock gravelly loam, clayey substratum, 15 to 25 percent slopes
Un	Unadilla silt loam
VAB	Valois very bouldery soils, gently sloping *
VAD	Valois very bouldery soils, moderately steep *
VoA	Volusia gravelly silt loam, 0 to 3 percent slopes
VoB	Volusia gravelly silt loam, 3 to 8 percent slopes
VoC	Volusia gravelly silt loam, 8 to 15 percent slopes
VSB	Volusia very stony soils, gently sloping *
Wa	Walpole fine sandy loam
Wb	Wayland silt loam
Wc	Wayland mucky silt loam
WeB	Wellsboro flaggy silt loam, 3 to 8 percent slopes
WeC	Wellsboro flaggy silt loam, 8 to 15 percent slopes
WLB	Wellsboro and Wurtsboro very bouldery soils, gently sloping *
WOB	Wellsboro and Wurtsboro extremely bouldery soils, gently sloping *
WsA	Williamson silt loam, 0 to 3 percent slopes
WsB	Williamson silt loam, 3 to 8 percent slopes
WuB	Wurtsboro stony loam, 3 to 8 percent slopes

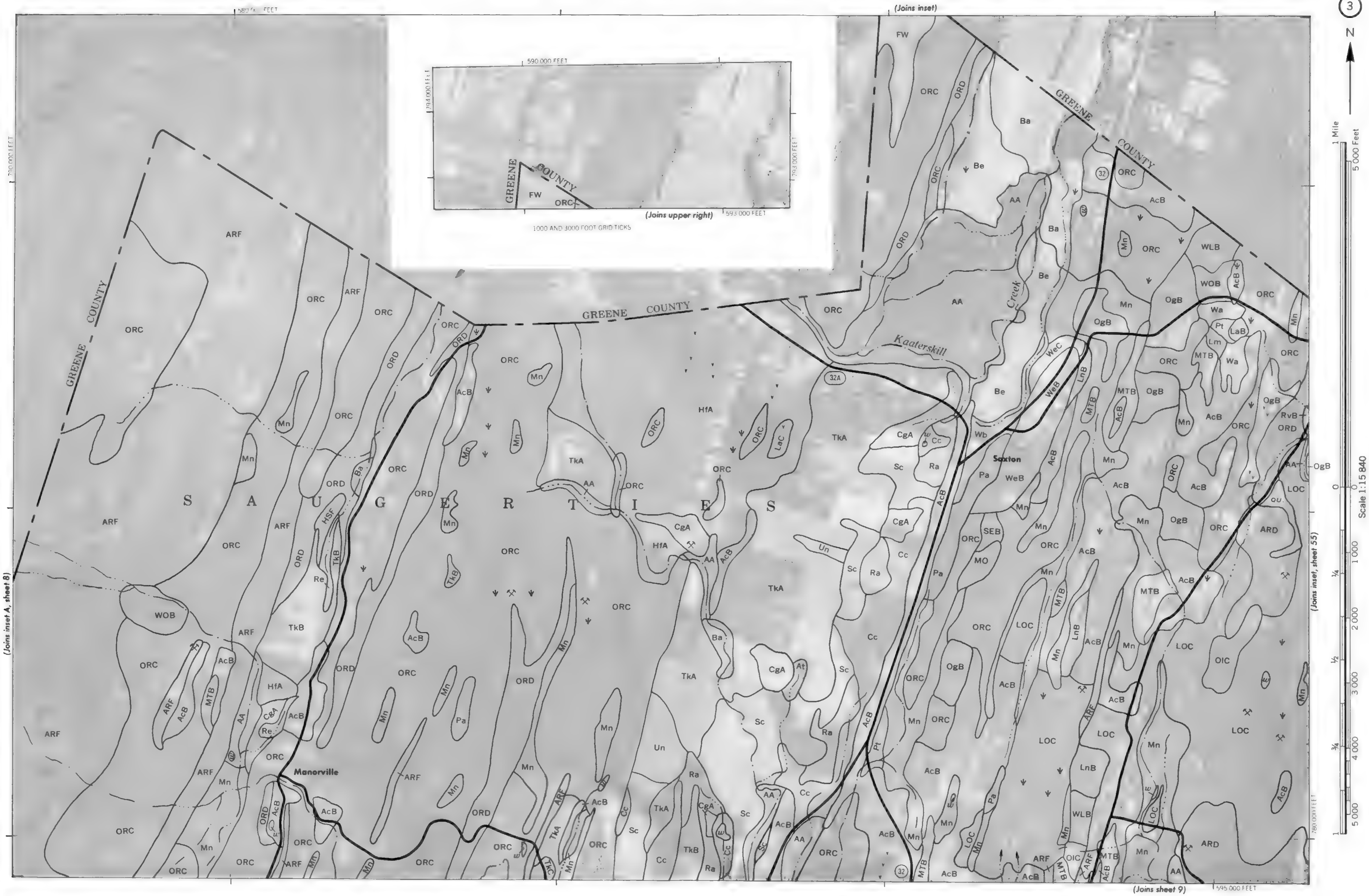
* The composition of these units is more variable than others in the survey area, but has been controlled well enough to be interpreted for the expected use of the soils

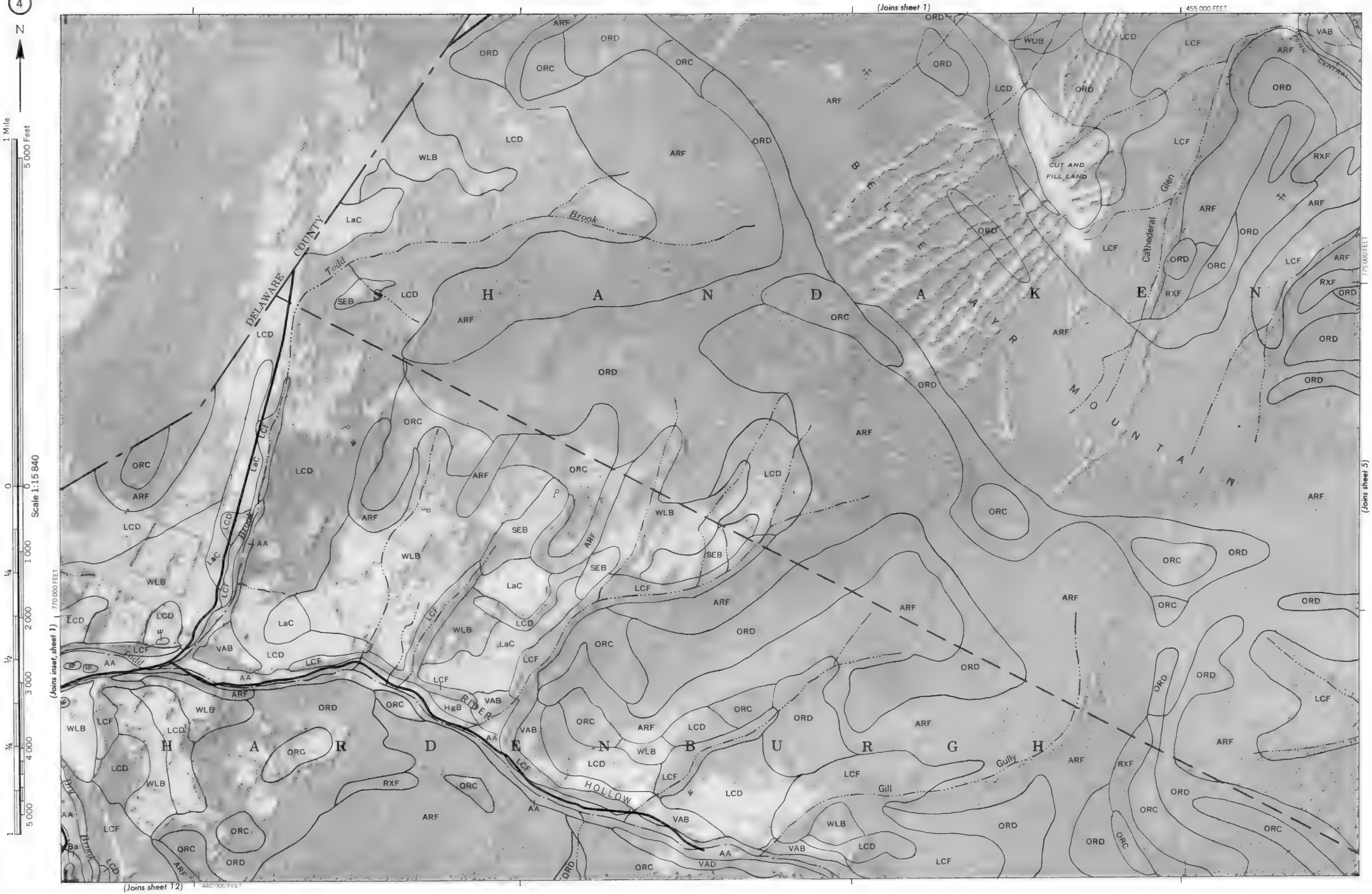


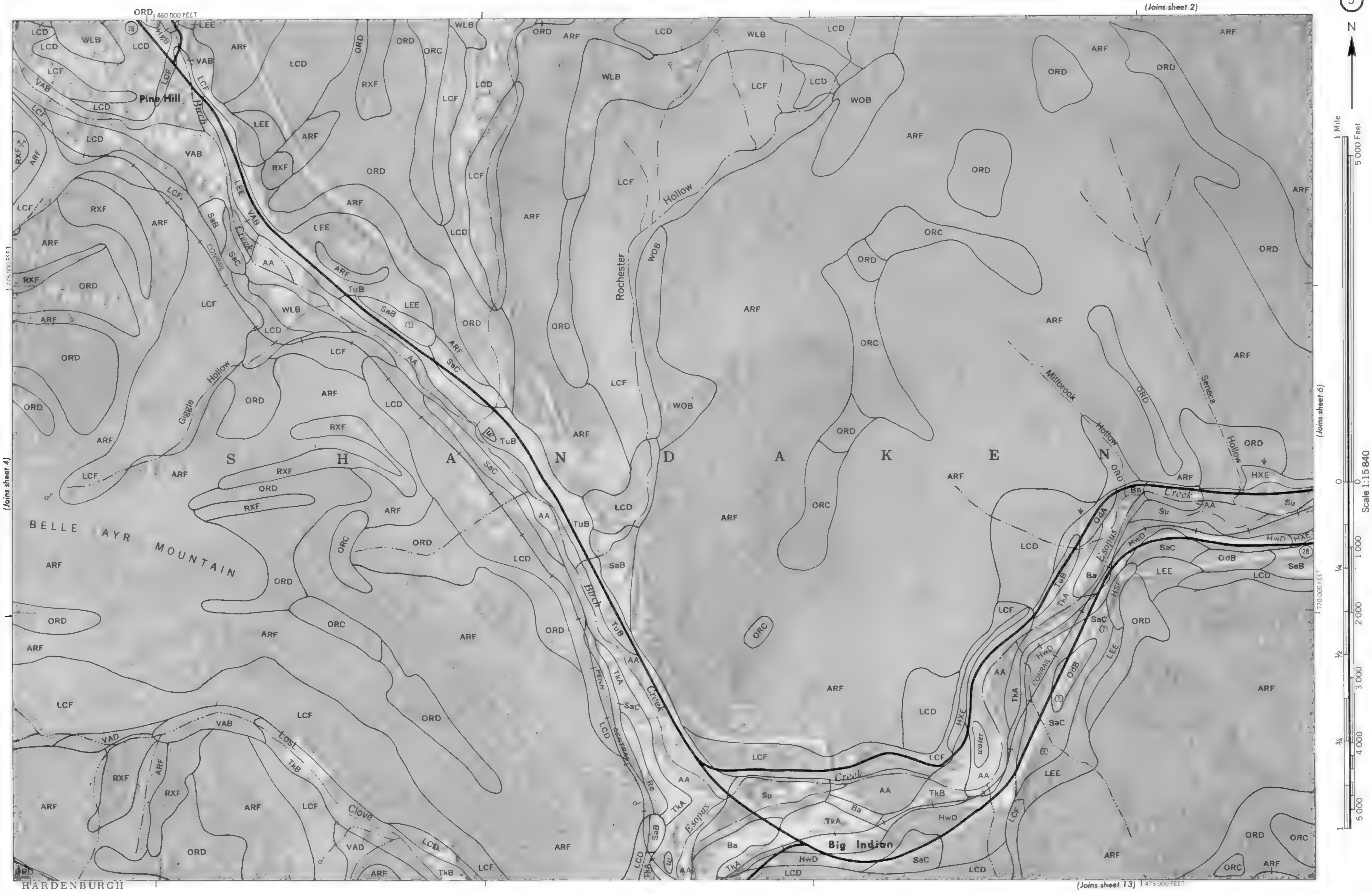
1
N
DELAWARE COUNTY
HARDENBURGH
Mapledale
Tompkins Hollow
Chimney Hollow
Dry Todd Brook
(Joins sheet 4)
(Joins sheet 11)
430 000 FEET
435 000 FEET
440 000 FEET
455 000 FEET
DELAWARE COUNTY
SHANDAKEN
Highmount
CONRAIL
(Joins sheet 2)
(Joins sheet 4)
Scale 1:15 840
1 Mile
5 000 Feet

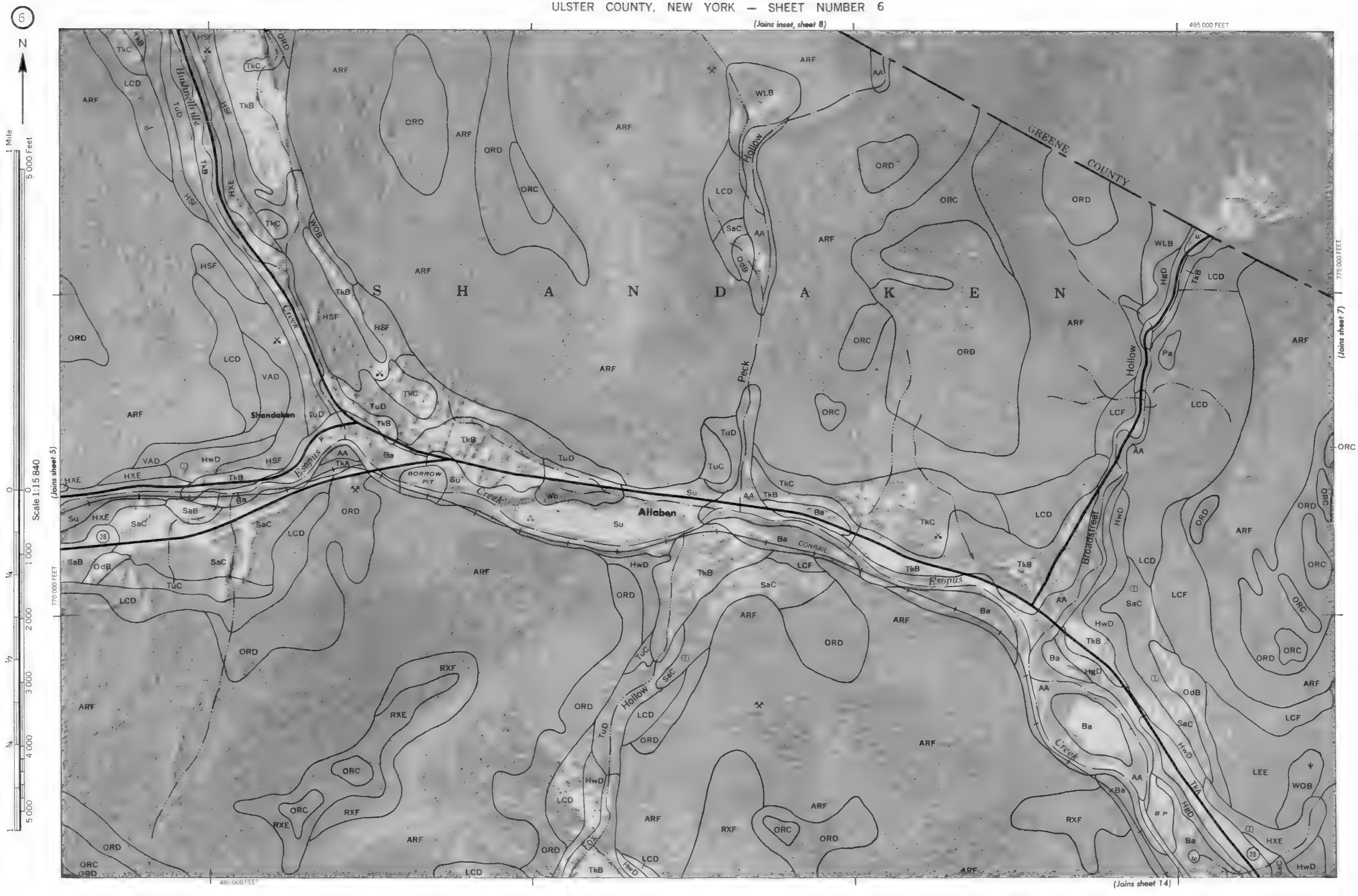

2
N
1 Mile
5 000 Feet
0
Scale 1:15 840
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000
475 000 FEET
790 000 FEET
780 000 FEET
460 000 FEET
(Joins sheet 1)
(Joins sheet 5)
(Joins inset B, sheet 8)
DELAWARE COUNTY
GREENE COUNTY
S H A N D A K E N
Rose Mtn
Birch Creek
Creek
Birch
CONRAIL
28
ORC
ORD
ARF
LCD
WLB
LaC
WOB
LaB
LCF
HgC
AA
RXF
VAD
HgB
LEE
HSF

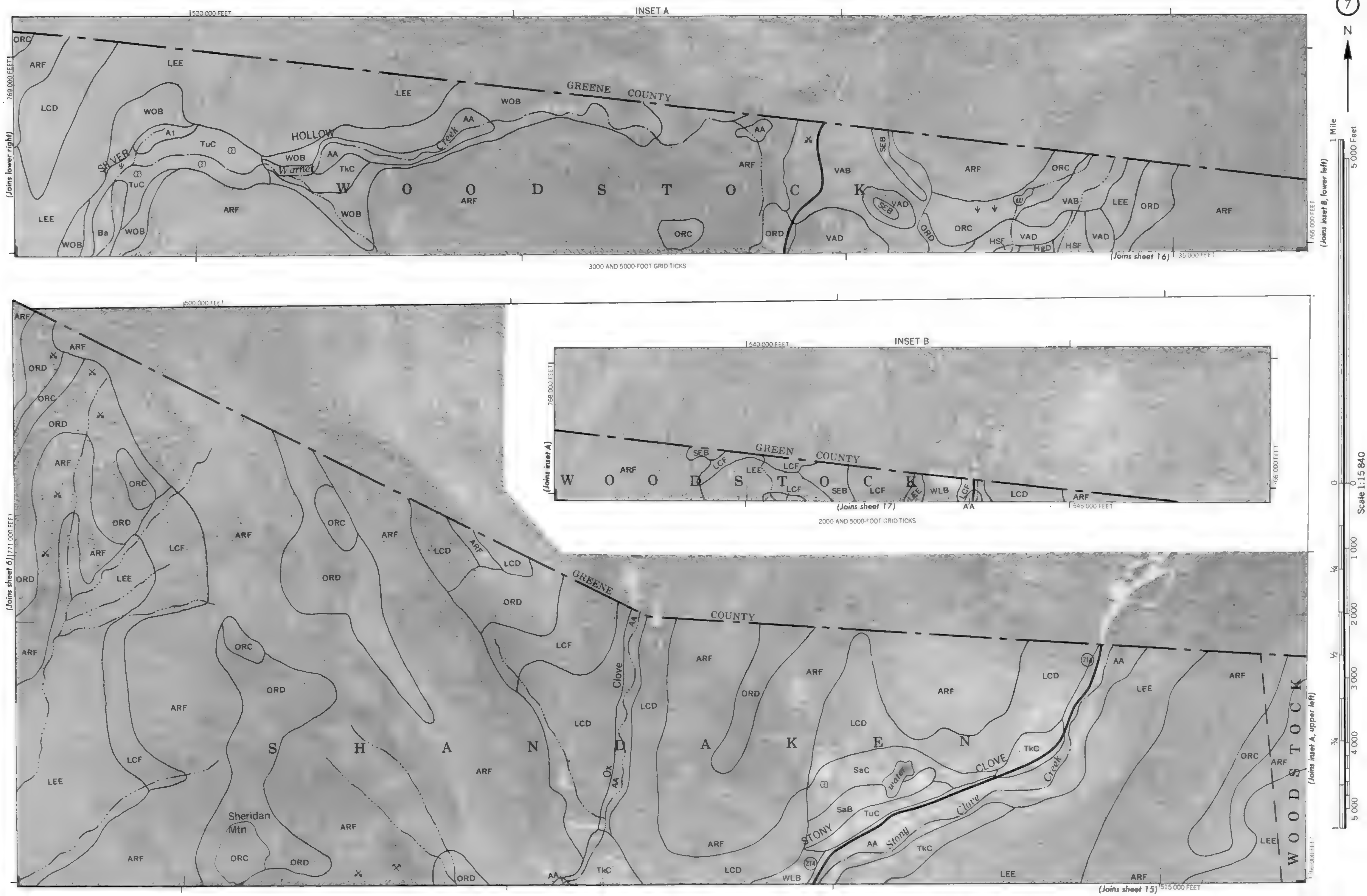
3


(Joins inset)
(Joins upper right)
1000 AND 3000 FOOT GRID TICKS
590 000 FEET
593 000 FEET
595 000 FEET
280 000 FEET
(Joins inset A, sheet 8)
(Joins inset, sheet 55)
(Joins sheet 9)
GREENE COUNTY
SAUGERTIES
Kaaterskill Creek
Saxton
Manorville
32
32A
N
1 Mile
5 000 Feet
Scale 1:15 840


4
N
(Joins sheet 1)
455 000 FEET
(Joins sheet 5)
(Joins inset, sheet 1)
(Joins sheet 12)
440 000 FEET
770 000 FEET
775 000 FEET
Scale 1:15 840
1 Mile
5 000 Feet
DELAWARE COUNTY
Todd Brook
S H A N D A K E N
H A R D E N B U R G H
BELLEAYR MOUNTAIN
Cathederal Glen
CUT AND FILL LAND
RIDER HOLLOW
Gully Gill
Dry Brook
PENN CENTRAL

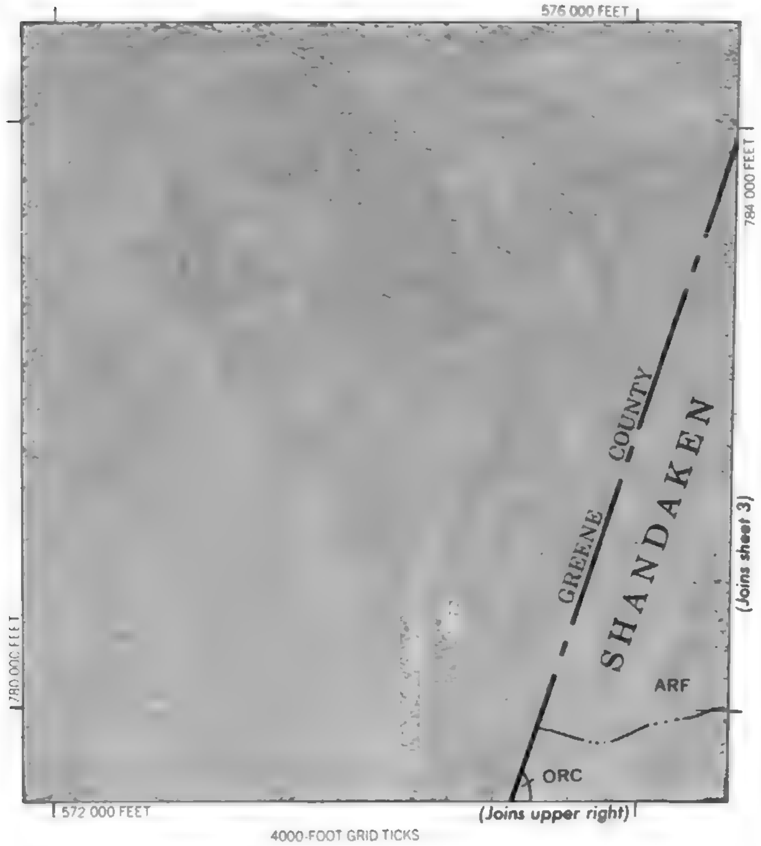

5
N
(Joins sheet 2)
(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 13)
460 000 FEET
475 000 FEET
770 000 FEET
775 000 FEET
Pine Hill
Birch Creek
Rochester Hollow
Giggle Hollow
S H A N D A K E N
BELLE AYR MOUNTAIN
Millbrook Hollow
Seneca Hollow
Esopus Creek
Big Indian
Lost Clove
CONRAIL
PENN
HARDENBURGH
1 Mile
5 000 Feet
Scale 1:15 840


6
N
(Joins inset, sheet 8)
(Joins sheet 5)
(Joins sheet 7)
(Joins sheet 14)
495 000 FEET
775 000 FEET
770 000 FEET
480 000 FEET
Scale 1:15 840
1 Mile
5 000 Feet
S H A N D A K E N
GREENE COUNTY
Shandaken
Allaben
Bushnellville Creek
Esopus Creek
Peck Hollow
Broadstreet Hollow
Fox Hollow
BORROW PIT
CONRAIL
28
ARF
ORD
ORC
LCD
LCF
TkB
TkC
TkA
HSF
HXE
TuD
TuC
VAD
HwD
SaB
SaC
Su
Ba
AA
WOB
WLB
OdB
RXF
RXE
HgD
Pa
LEE
Wb
BP

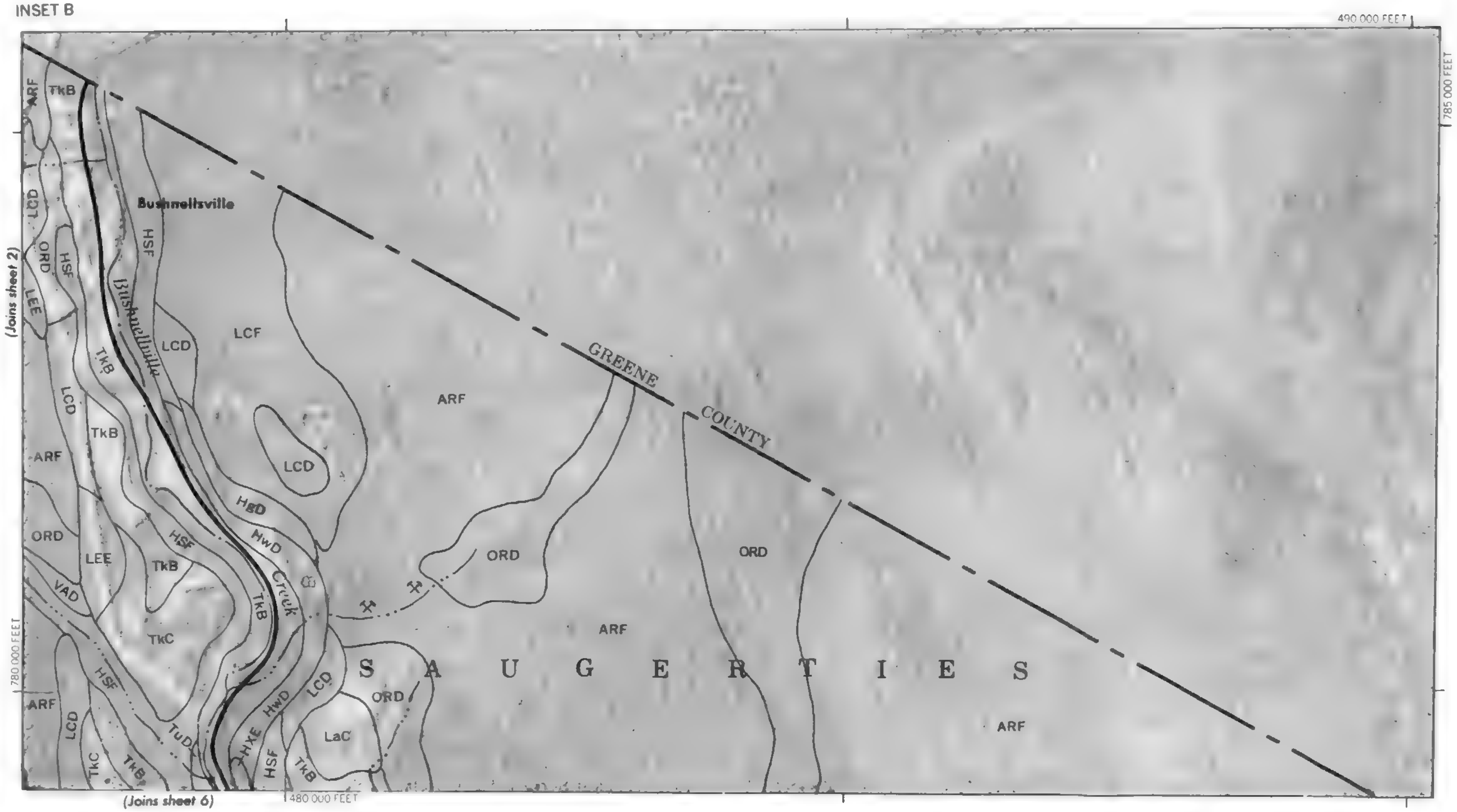

INSET A
520 000 FEET
769 000 FEET
(Joins lower right)
GREENE COUNTY
WOODSTOCK
HOLLOW
SILVER
Warner
Creek
(Joins sheet 16)
35 000 FEET
766 000 FEET
(Joins inset B, lower left)
3000 AND 5000-FOOT GRID TICKS
INSET B
540 000 FEET
768 000 FEET
(Joins inset A)
GREEN COUNTY
WOODSTOCK
(Joins sheet 17)
545 000 FEET
766 000 FEET
2000 AND 5000-FOOT GRID TICKS
500 000 FEET
771 000 FEET
(Joins sheet 6)
GREENE COUNTY
SHANDAKEN
Clove
Sheridan Mtn
STONY CLOVE
Stony Clove Creek
214
WOODSTOCK
(Joins inset A, upper left)
(Joins sheet 15)
515 000 FEET
7
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000

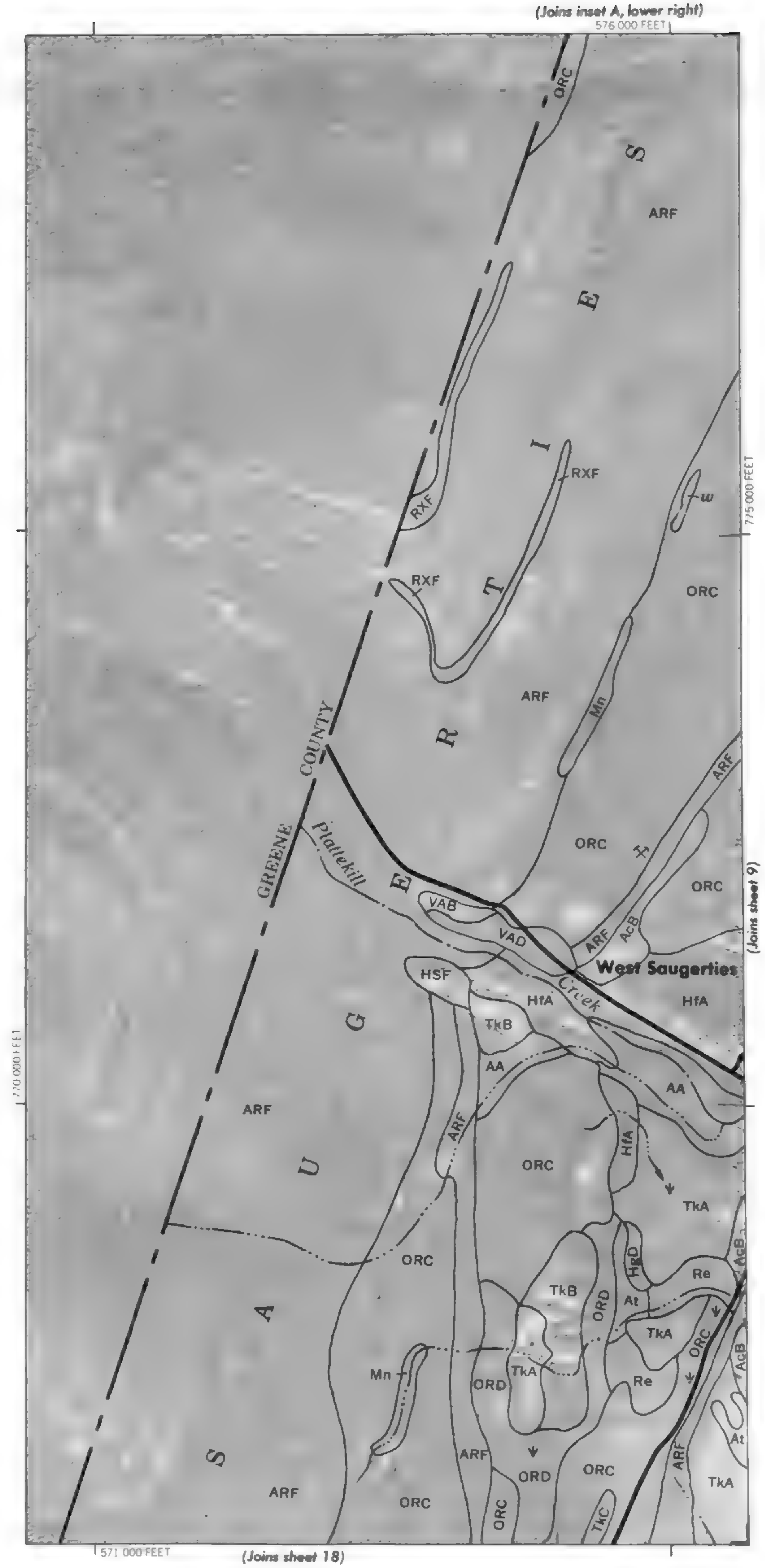
8

INSET A

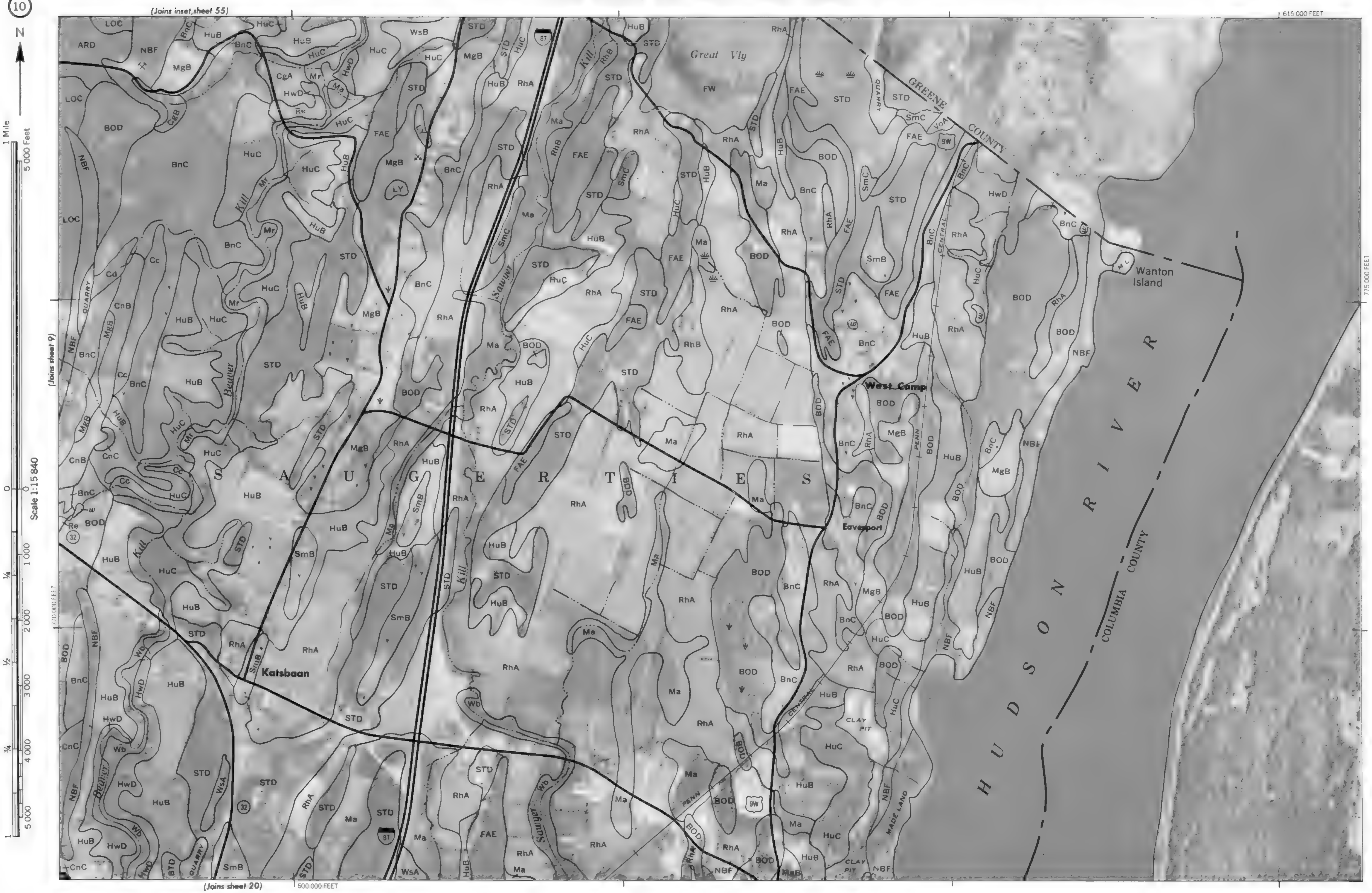


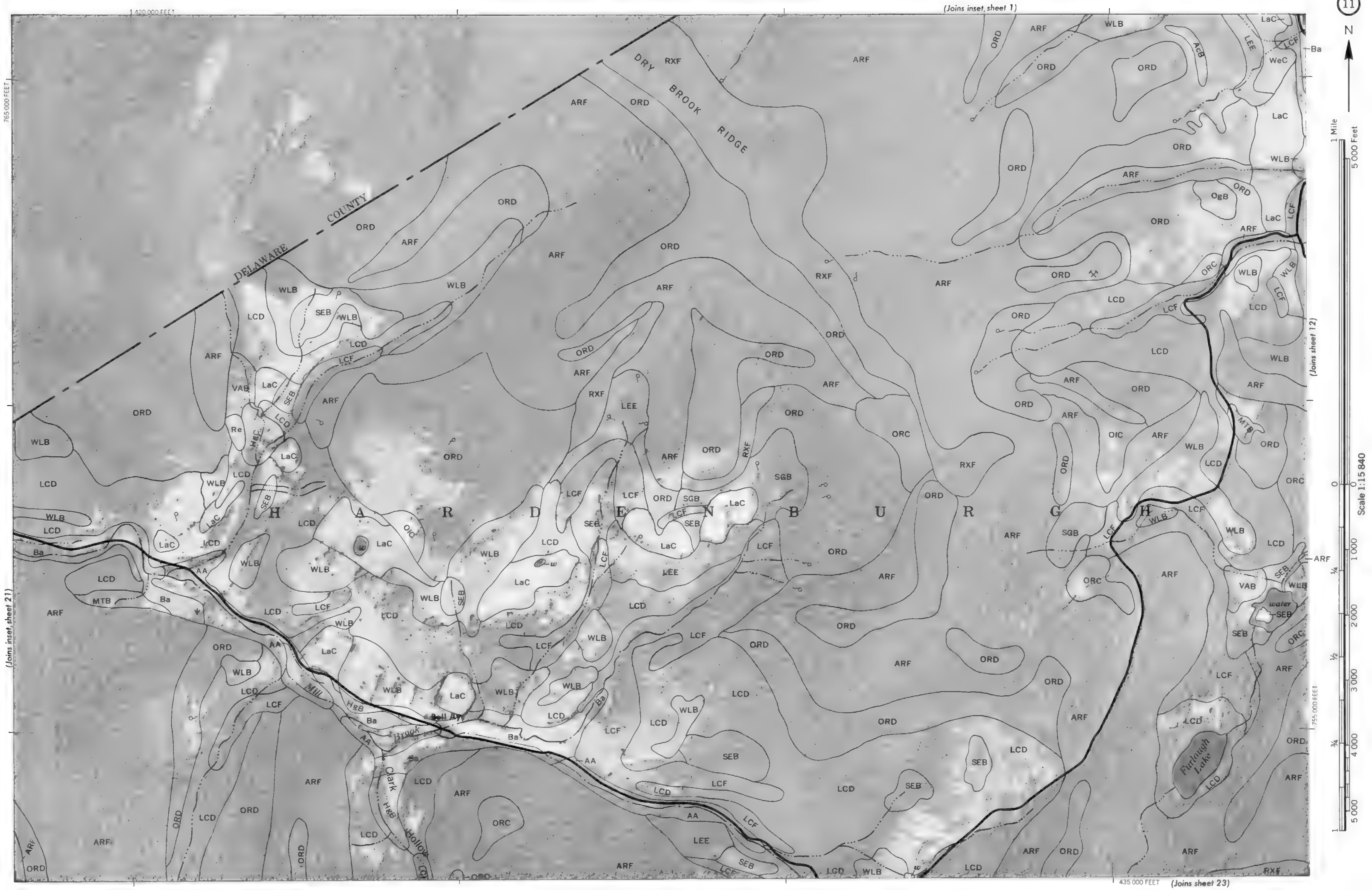
INSET B



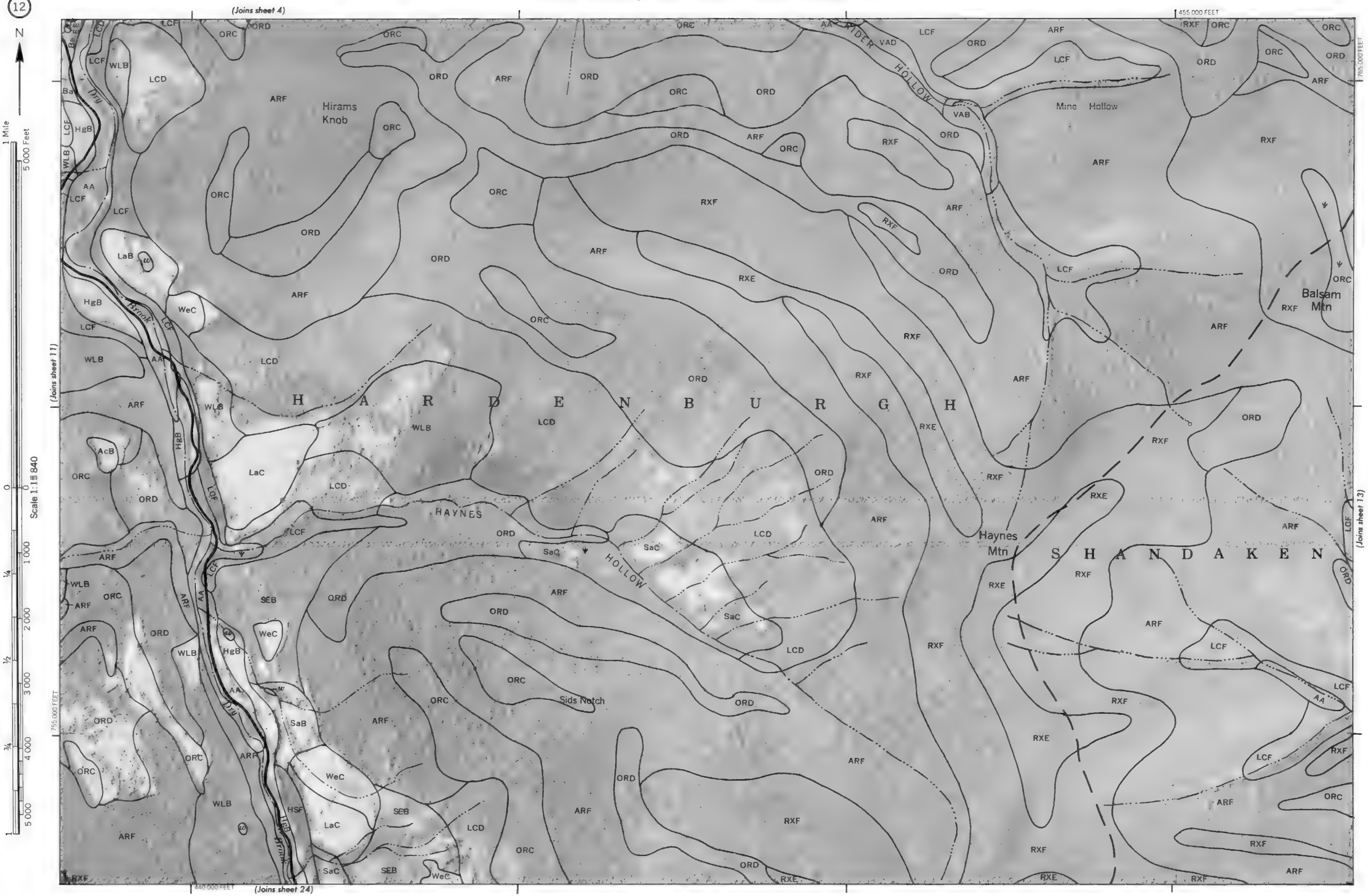


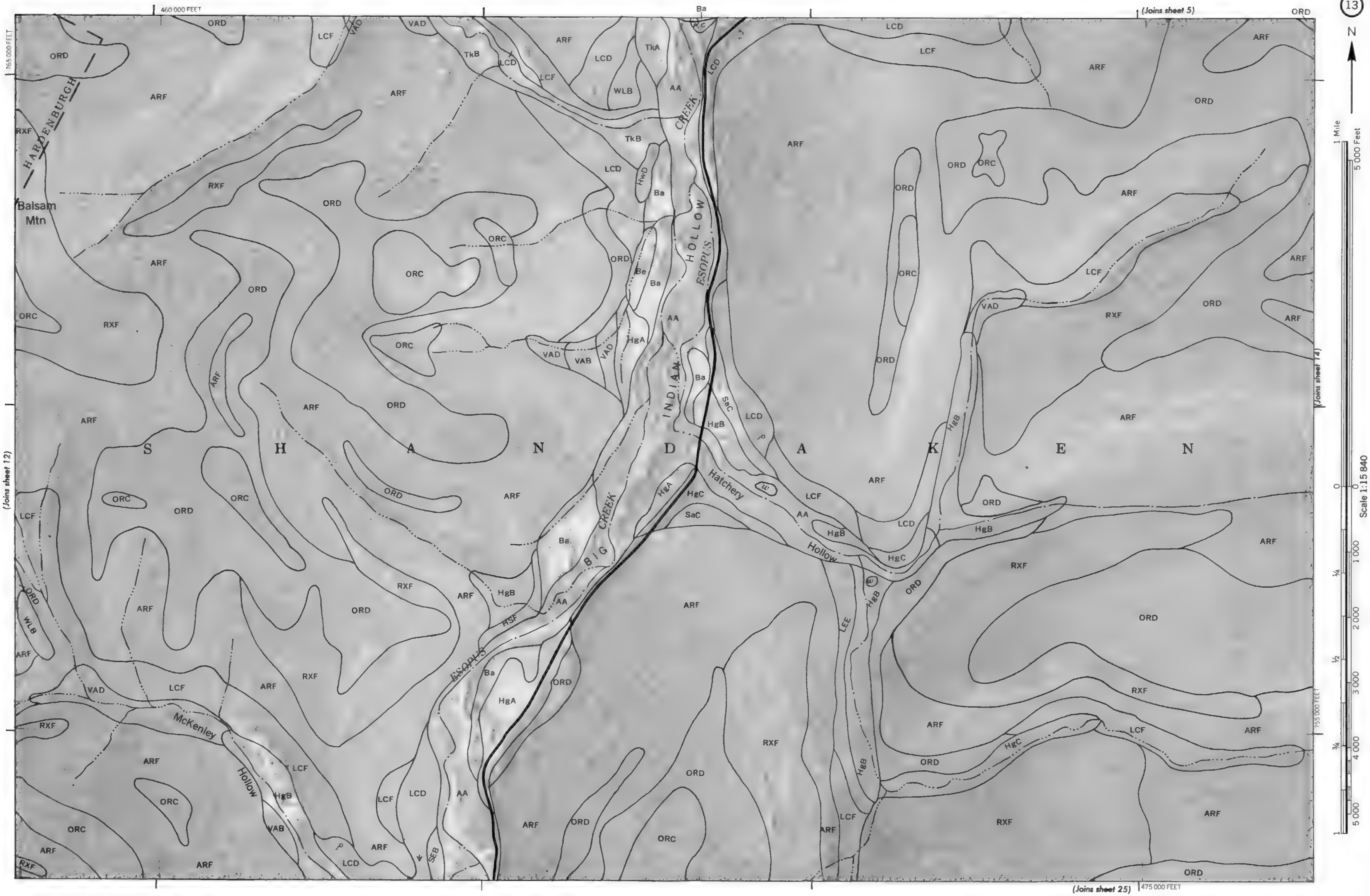

(Joins sheet 3)
(Joins sheet 8)
(Joins sheet 10)
(Joins sheet 19)
9
N
SAUGERTIES
Quarryville
West Saugerties
Blue Mountain
Mt Airy
Saugerties Reservoir
Lucas Kill
Plattekill
Plattekill Creek
Kill
Creek
QUARRY
CUT AND FILL LAND
water
1 Mile
5 000 Feet
Scale 1:15 840
775 000 FEET
770 000 FEET
595 000 FEET

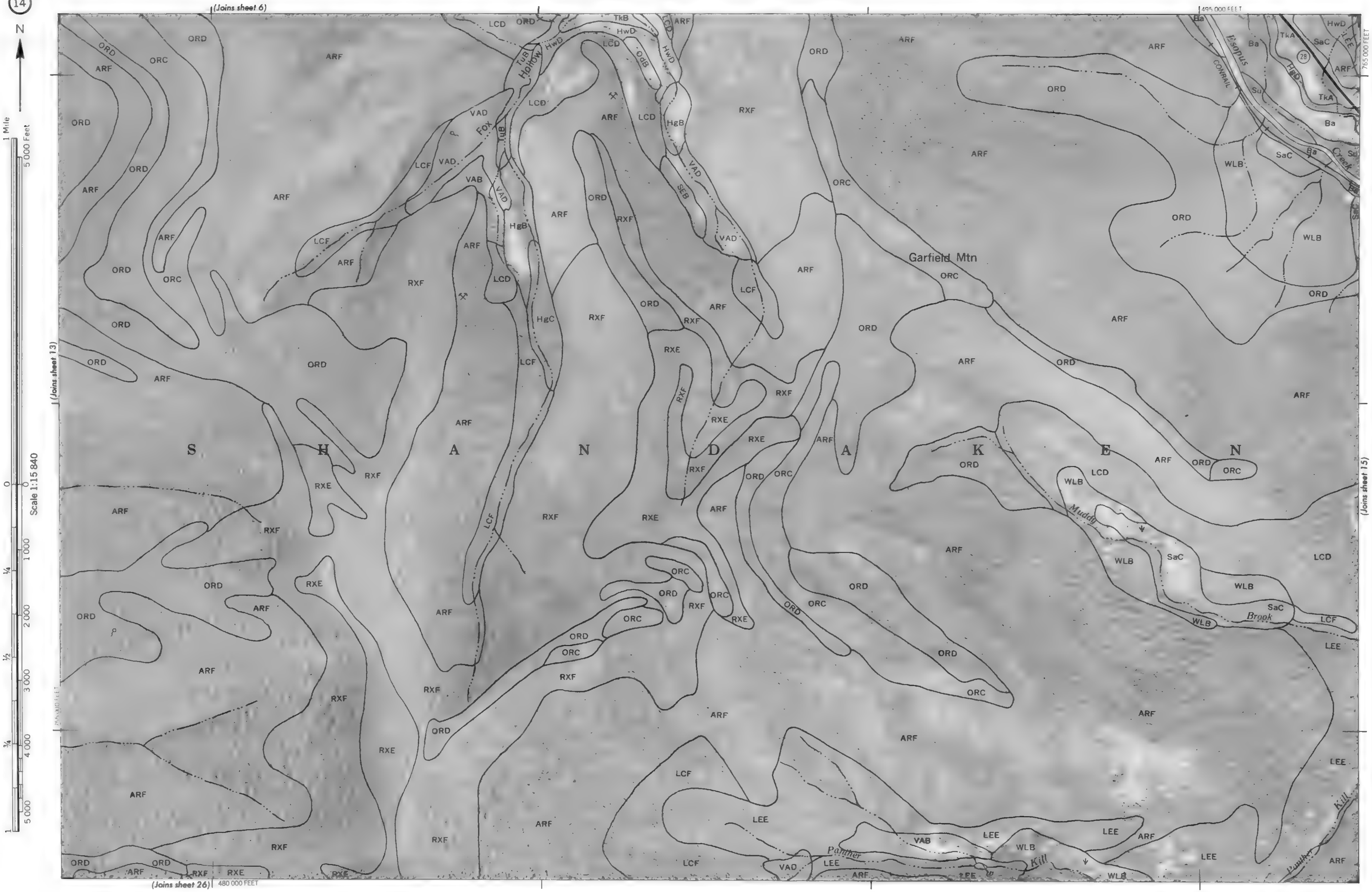

10
N
(Joins inset, sheet 55)
(Joins sheet 9)
(Joins sheet 20)
615 000 FEET
775 000 FEET
770 000 FEET
600 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
Great Vly
GREENE COUNTY
COLUMBIA COUNTY
HUDSON RIVER
Wanton Island
West Camp
Eavesport
Katsbaan
SAUGERTIES
Beaver Kill
Sawyer Kill
QUARRY
CLAY PIT
MADE LAND
CENTRAL
PENN

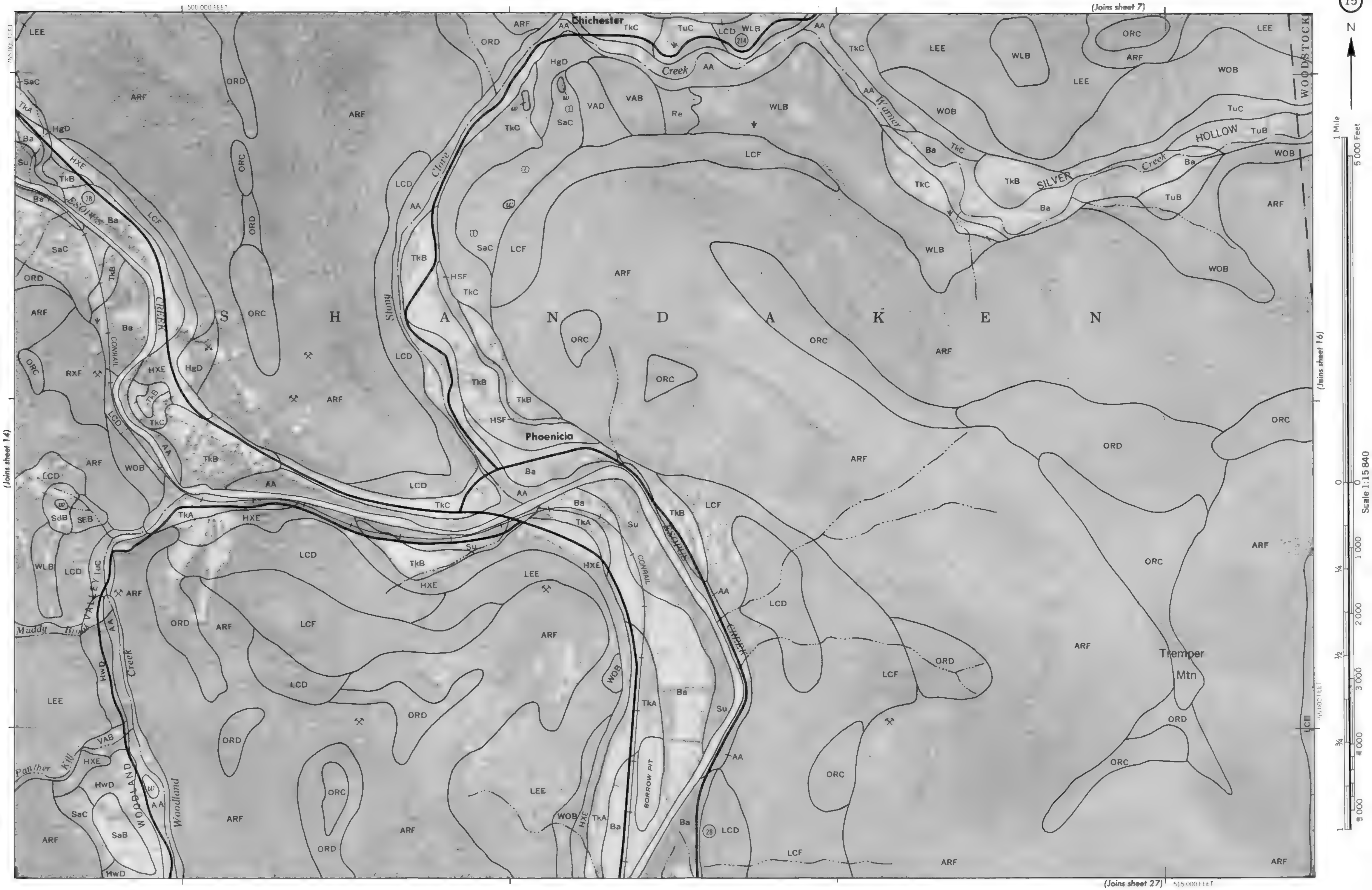


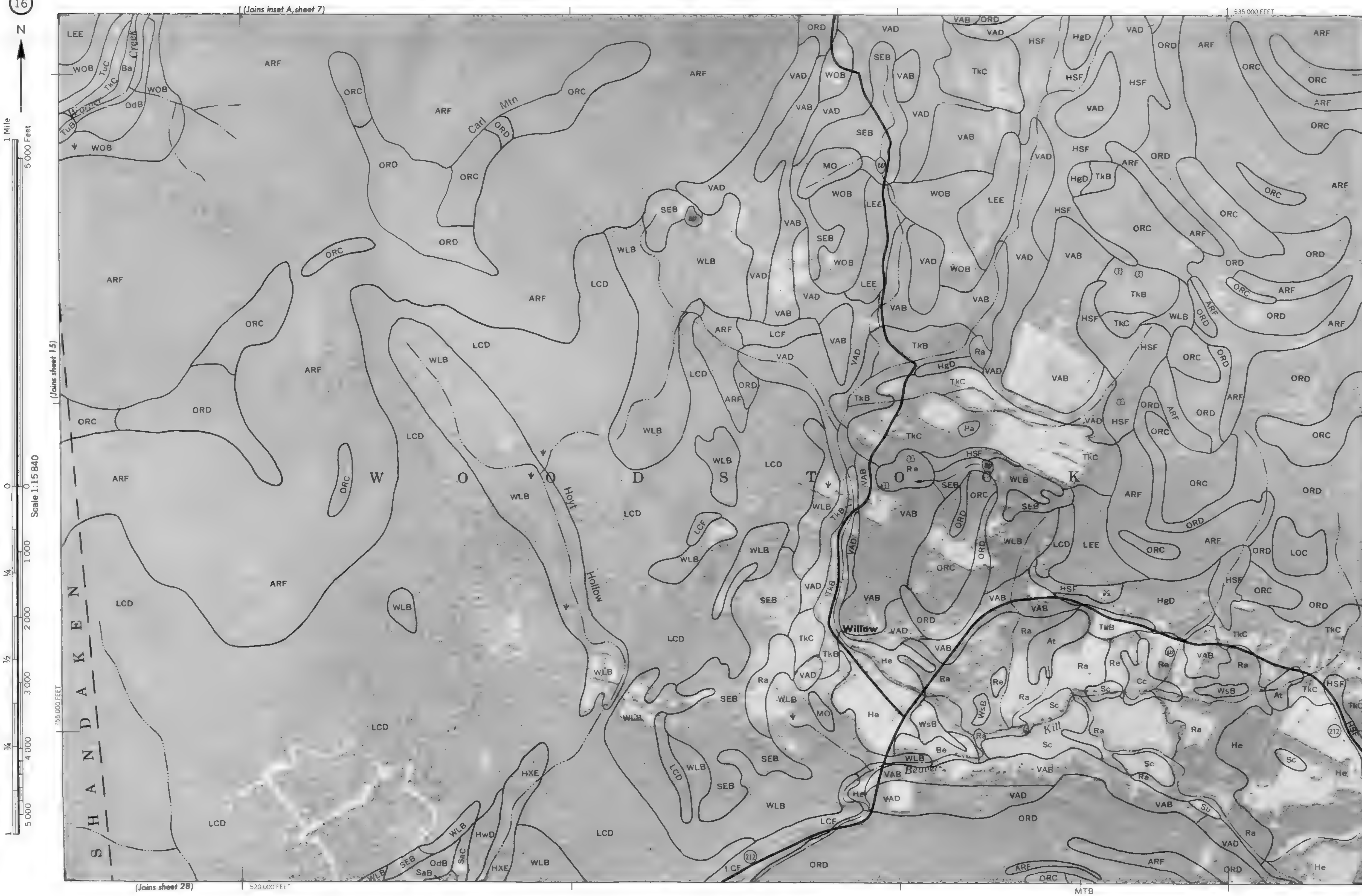
11
N
(Joins inset, sheet 1)
(Joins sheet 12)
(Joins sheet 23)
(Joins inset, sheet 21)
420 000 FEET
765 000 FEET
755 000 FEET
435 000 FEET
DELAWARE COUNTY
DRY BROOK RIDGE
H A R D E N B U R G H
Mill Brook
Clark Hollow
Bell Ay
Furlough Lake
water
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000

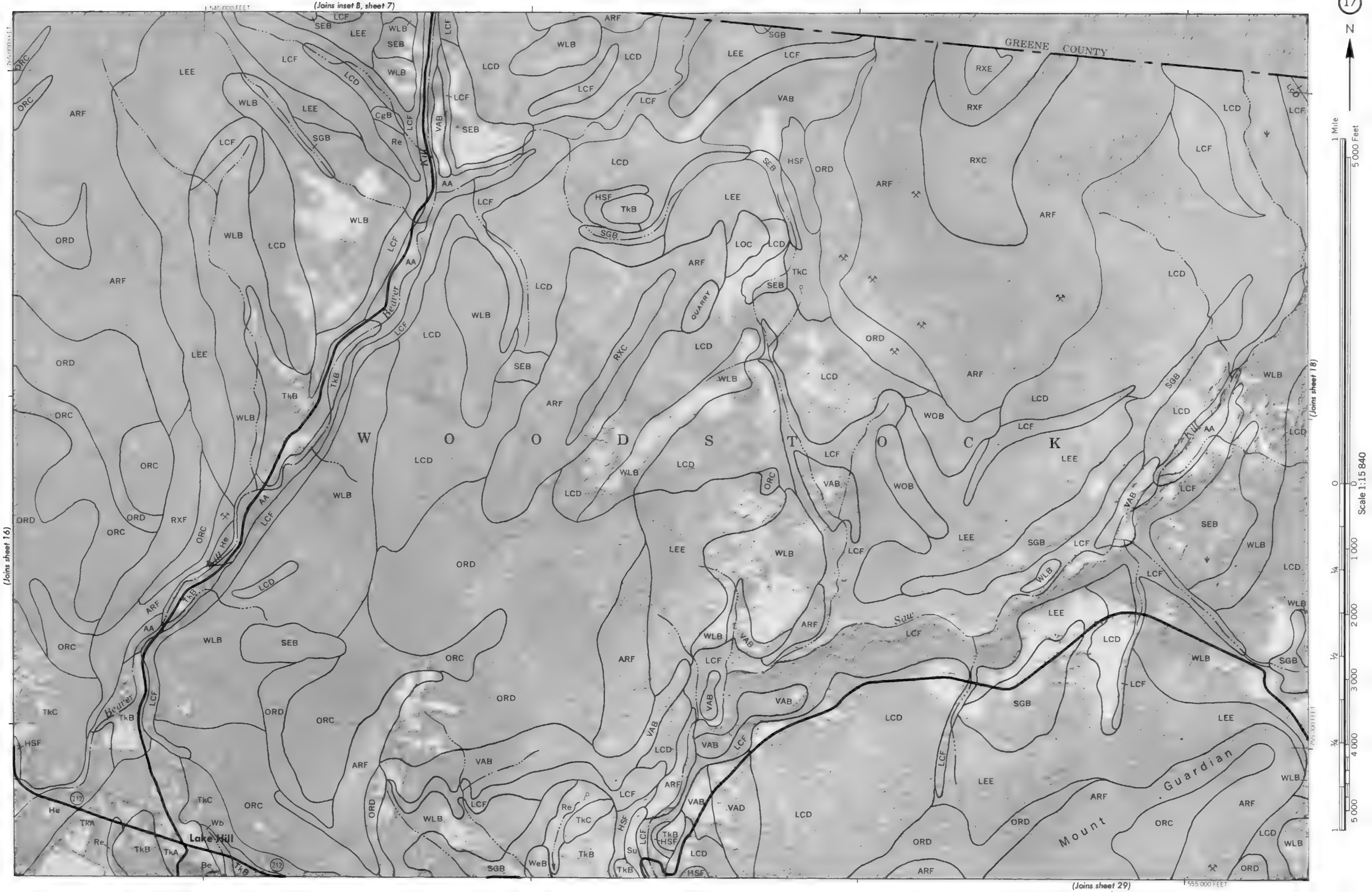

12
N
(Joins sheet 4)
(Joins sheet 11)
(Joins sheet 13)
(Joins sheet 24)
455 000 FEET
765 000 FEET
755 000 FEET
440 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1
Hirams Knob
RIDER HOLLOW
Mine Hollow
Balsam Mtn
H A R D E N B U R G H
HAYNES HOLLOW
Haynes Mtn
S H A N D A K E N
Sids Notch
Dry Brook

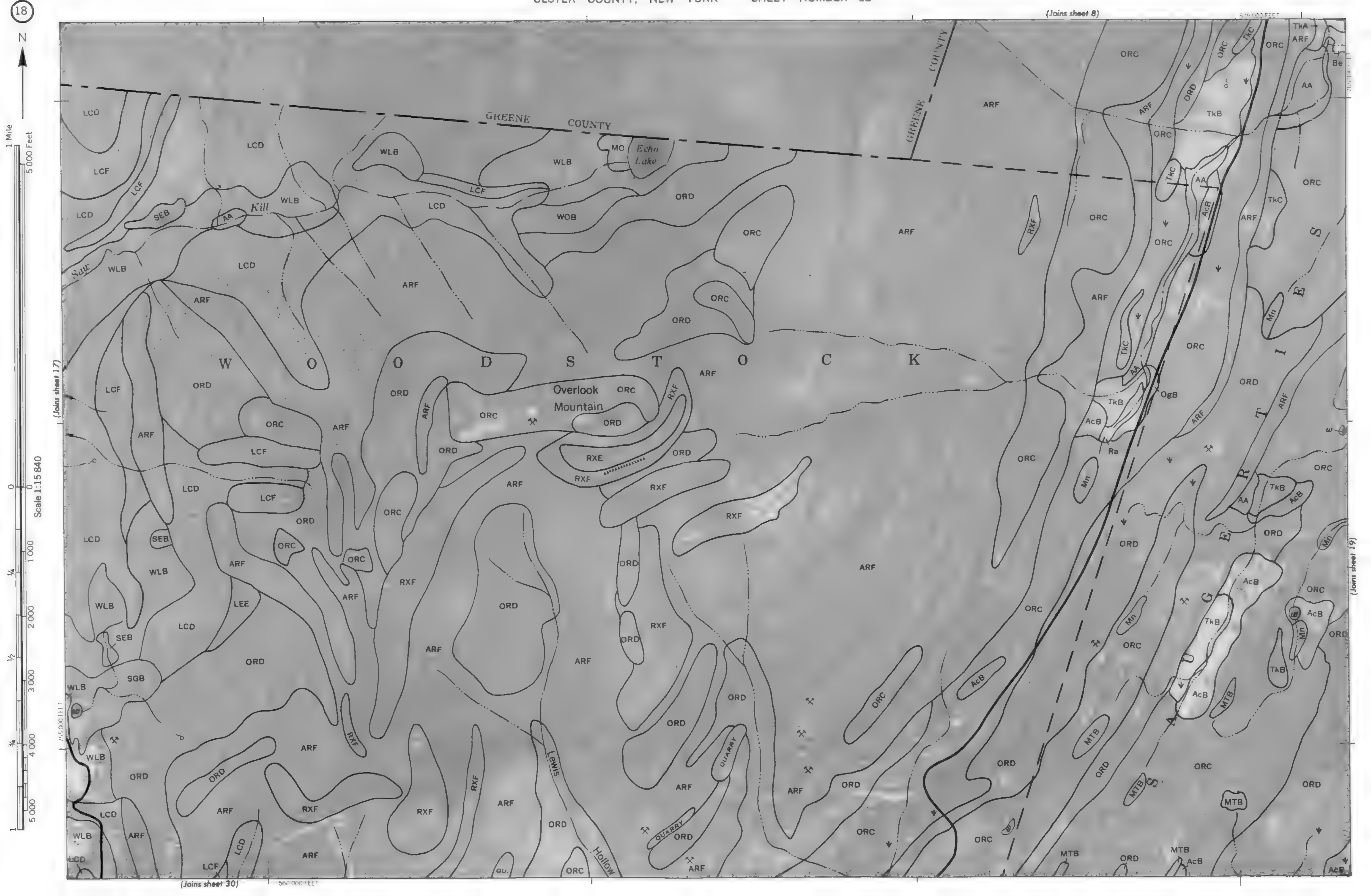

13
N
460 000 FEET
765 000 FEET
(Joins sheet 5)
(Joins sheet 12)
(Joins sheet 14)
(Joins sheet 25)
475 000 FEET
755 000 FEET
HARDENBURGH
Balsam Mtn
S H A N D A K E N
INDIAN HOLLOW
ESOPUS CREEK
BIG CREEK
ESOPUS
Hatchery Hollow
McKenley Hollow
LEE
1 Mile
5 000 Feet
Scale 1:15 840

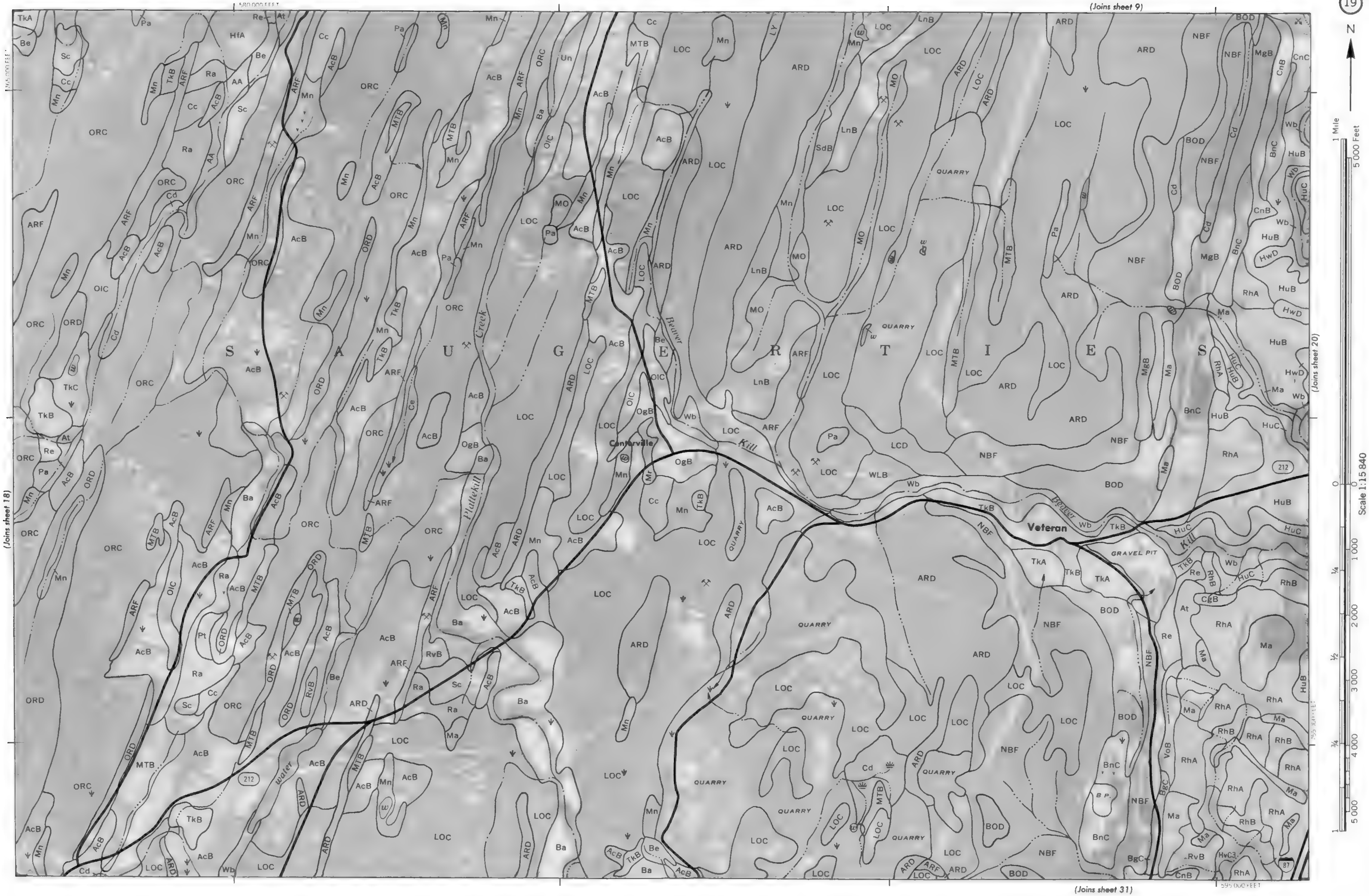

14
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 6)
(Joins sheet 13)
(Joins sheet 15)
(Joins sheet 26)
495 000 FEET
765 000 FEET
480 000 FEET
S H A N D A K E N
Garfield Mtn
Fox Hollow
Esopus Creek
CONRAIL
28
Muddy Brook
Panther Kill
ARF
ORD
ORC
RXF
RXE
LCD
LCF
VAD
VAB
HgB
HgC
HwD
TuB
TkB
TkA
SEB
WLB
SaC
LEE
Ba
Su
LCE

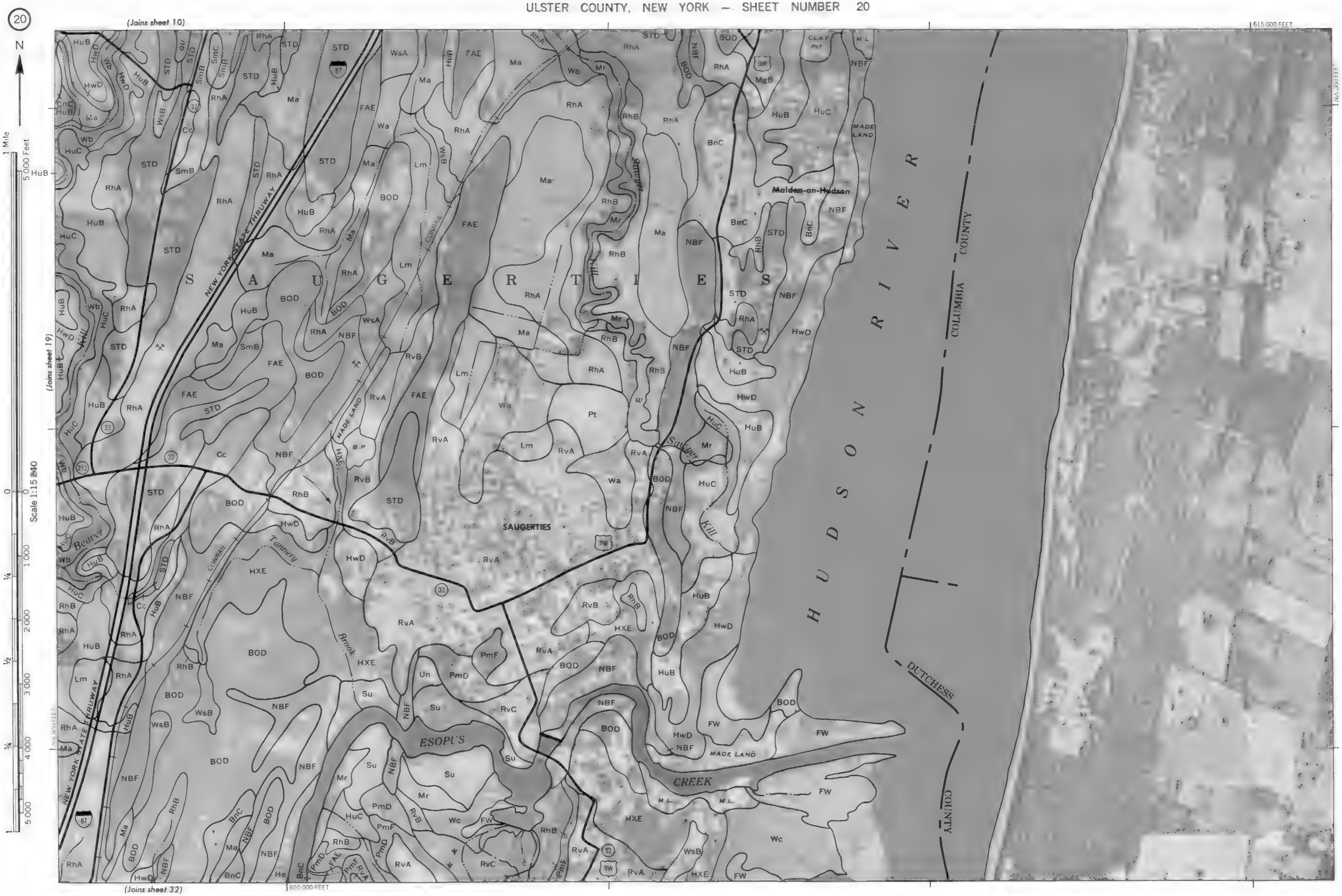

15
N
(Joins sheet 7)
(Joins sheet 14)
(Joins sheet 16)
(Joins sheet 27)
500 000 FEET
515 000 FEET
WOODSTOCK
S H A N D A K E N
Chichester
Phoenicia
Tremper Mtn
Stony Clove
Creek
Warner
SILVER HOLLOW
ESOPUS CREEK
CONRAIL
Muddy Brook
VALLEY
Woodland Creek
WOODLAND
Panther Kill
BORROW PIT
214
28
LEE
ARF
ORD
ORC
LCD
LCF
WOB
WLB
TkC
TuC
TkB
TuB
TkA
HgD
VAD
VAB
Re
Ba
Su
SaC
SaB
SdB
SEB
HXE
HSF
RXF
HwD
AA
1 Mile
5 000 Feet
Scale 1:15 840
0
1000
2000
3000
4000
5000
¼
½
¾
1


16
N
(Joins inset A, sheet 7)
(Joins sheet 15)
(Joins sheet 17)
(Joins sheet 28)
535 000 FEET
765 000 FEET
755 000 FEET
520 000 FEET
MTB
1 Mile
5 000 Feet
Scale 1:15 840
Carl Mtn
Wagner Creek
Hoyt Hollow
W O O D S T O C K
S H A N D A K E N
Willow
Beaver Kill
212

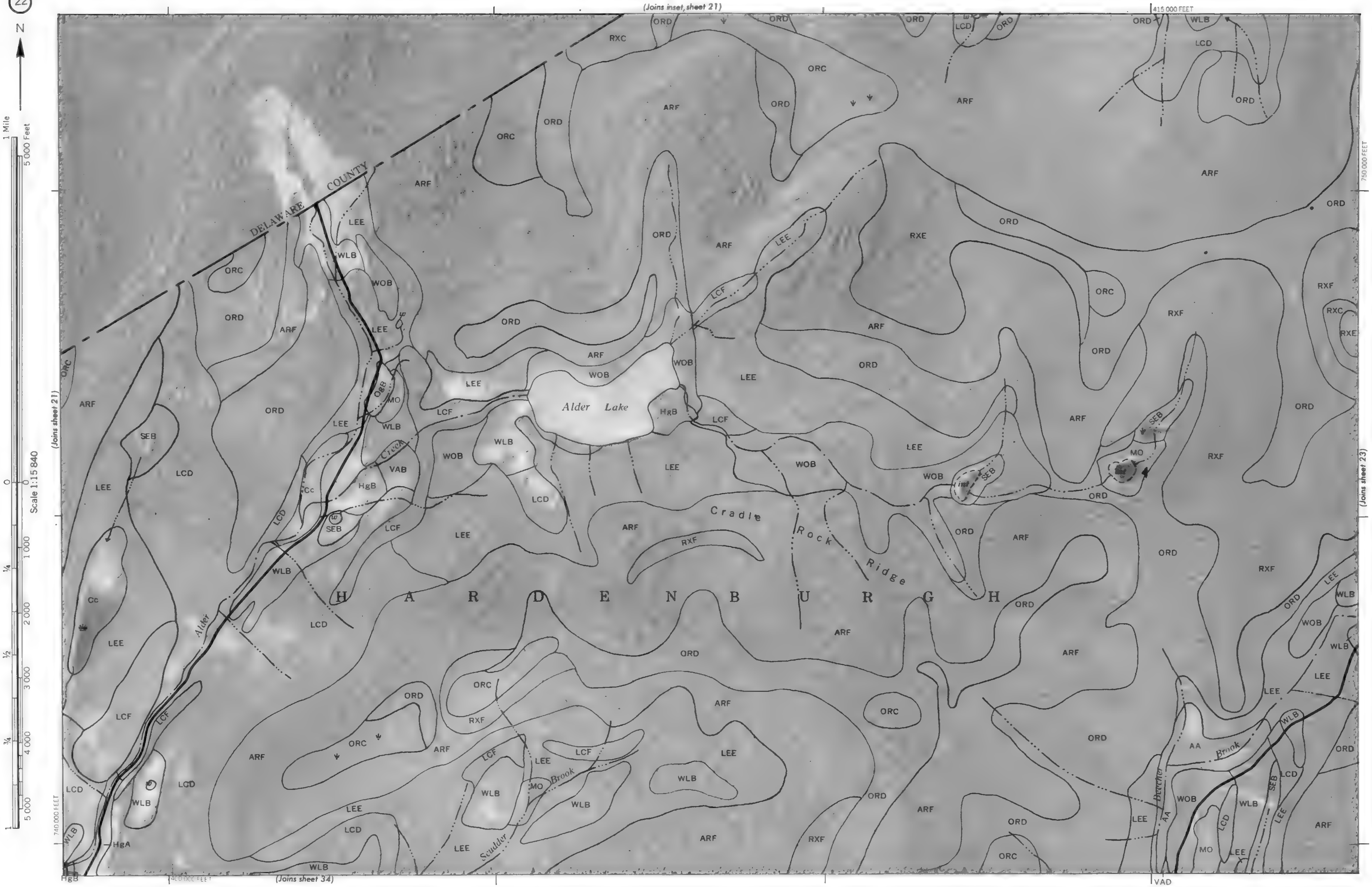

(Joins inset B, sheet 7)
(Joins sheet 16)
(Joins sheet 18)
(Joins sheet 29)
GREENE COUNTY
W O O D S T O C K
Beaver Kill
Saw Kill
Mount Guardian
Lake Hill
QUARRY
N
Scale 1:15 840
1 Mile
5 000 Feet
555 000 FEET

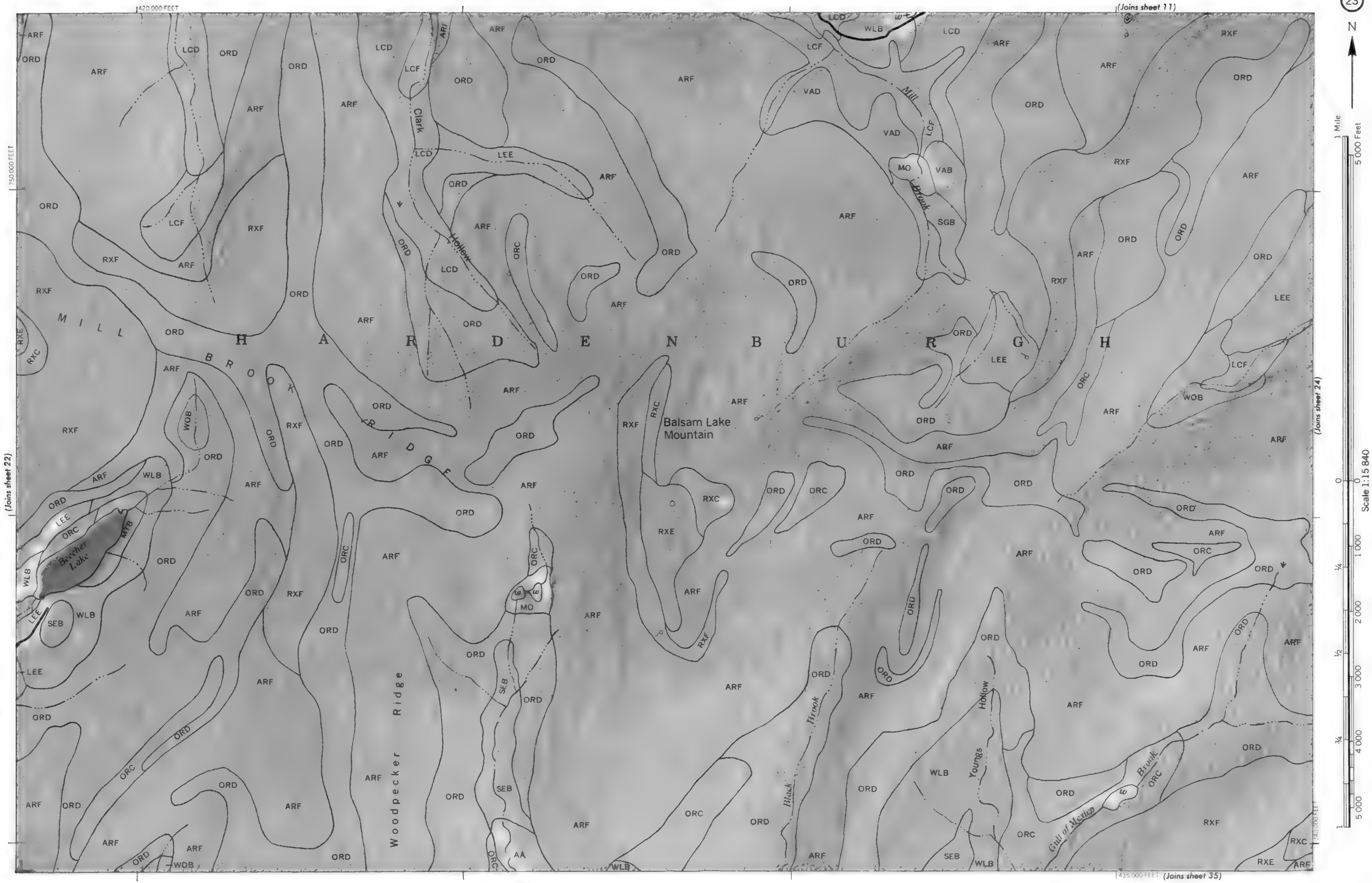

18
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 8)
(Joins sheet 17)
(Joins sheet 19)
(Joins sheet 30)
GREENE COUNTY
W O O D S T O C K
S A U G E R T I E S
Overlook Mountain
Echo Lake
Saw Kill
Lewis Hollow
QUARRY
ARF
ORC
ORD
LCD
LCF
WLB
WOB
SEB
SGB
AA
MO
RXF
RXE
LEE
TkB
TkC
TkA
AcB
OgB
Mn
MTB
Ra
Be

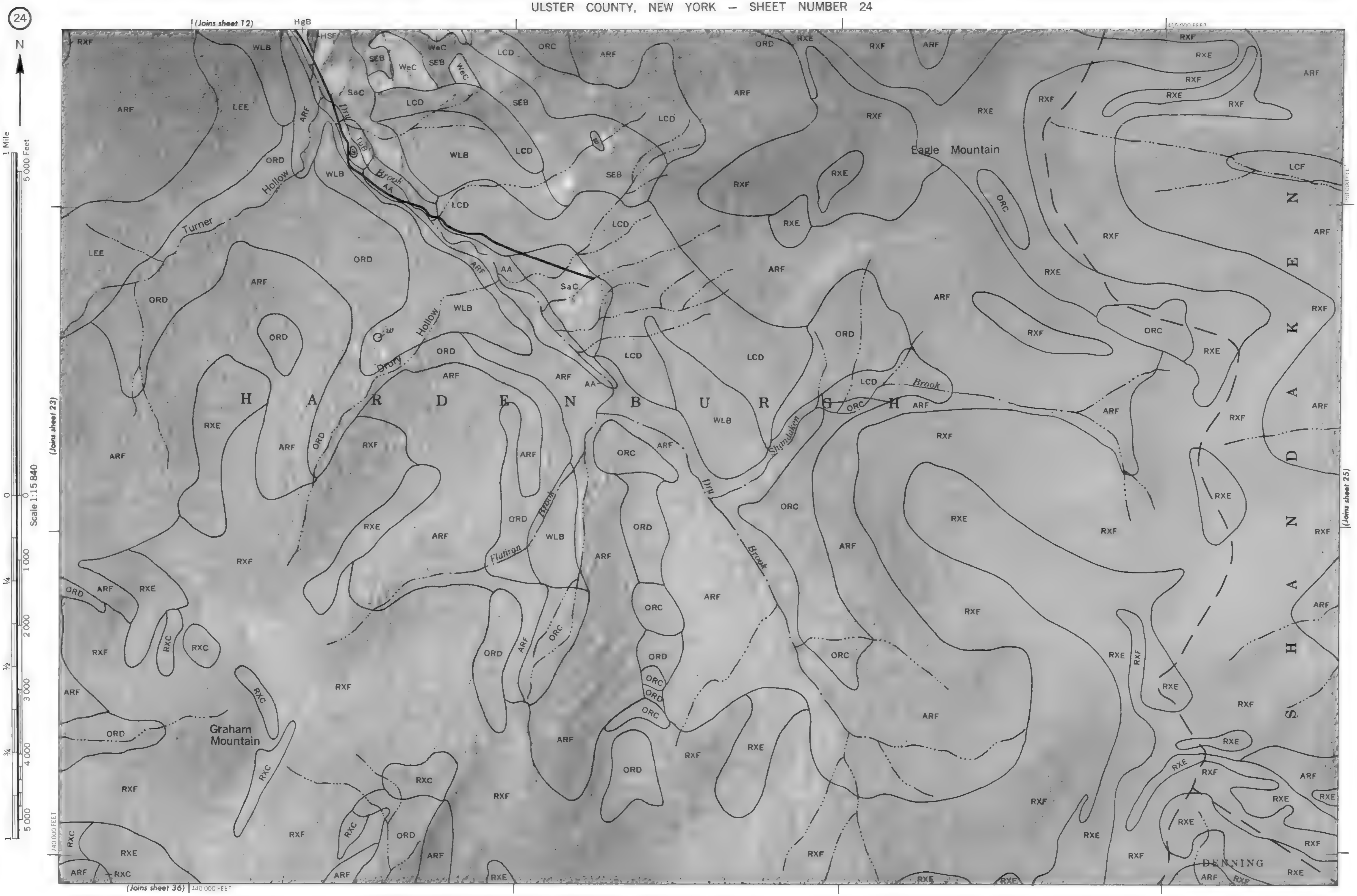

(Joins sheet 9)
(Joins sheet 18)
(Joins sheet 20)
(Joins sheet 31)
19
N
S A U G E R T I E S
Centerville
Veteran
Platte kill
Creek
Beaver
Kill
Beaver
Kill
water
QUARRY
GRAVEL PIT
212
87
Scale 1:15 840
1 Mile
5 000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
580 000 FEET
595 000 FEET

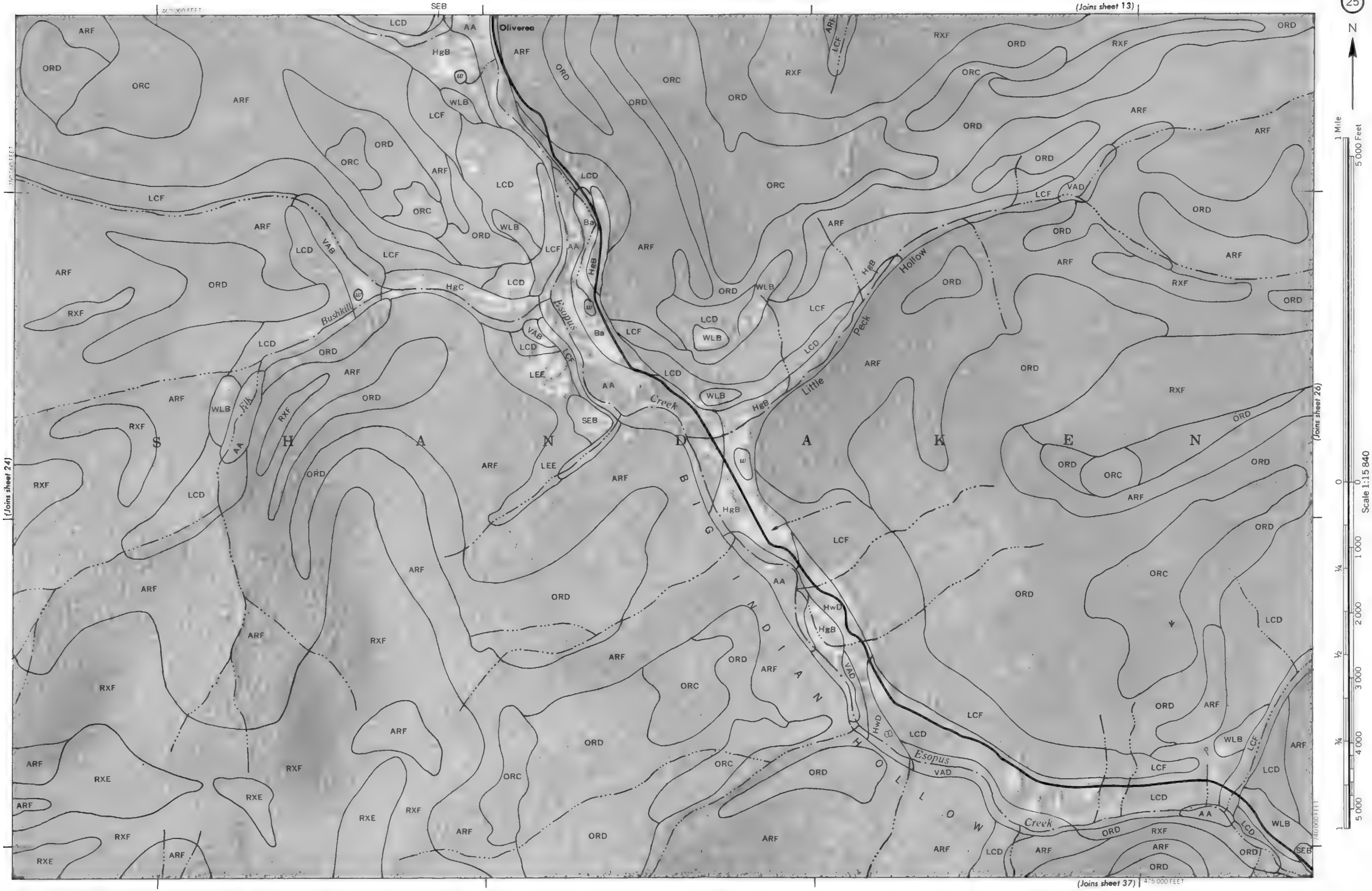

20
N
(Joins sheet 10)
(Joins sheet 19)
(Joins sheet 32)
1 Mile
5 000 Feet
Scale 1:15 840
615 000 FEET
600 000 FEET
NEW YORK STATE THRUWAY
S A U G E R T I E S
SAUGERTIES
Malden-on-Hudson
HUDSON RIVER
HUDSON
COLUMBIA COUNTY
DUTCHESS COUNTY
ESOPUS CREEK
Tannery Brook
Beaver Kill
Saugerties Kill
CONRAIL
MADE LAND
CLAY PIT


21
N
380 000 FEET
410 000 FEET
750 000 FEET
760 000 FEET
755 000 FEET
(Joins sheet 11)
(Joins sheet 22)
415 000 FEET
(Joins sheet 33)
395 000 FEET
DELAWARE COUNTY
HARDENBURGH
Mill Brook
Beaver
Kill
BORROW PIT
LCD
ARF
ORD
ORC
WLB
HgB
Ba
LCF
RXC
VAB
VAD
PIB
AA
Su
SEB
LOC
LEE
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000

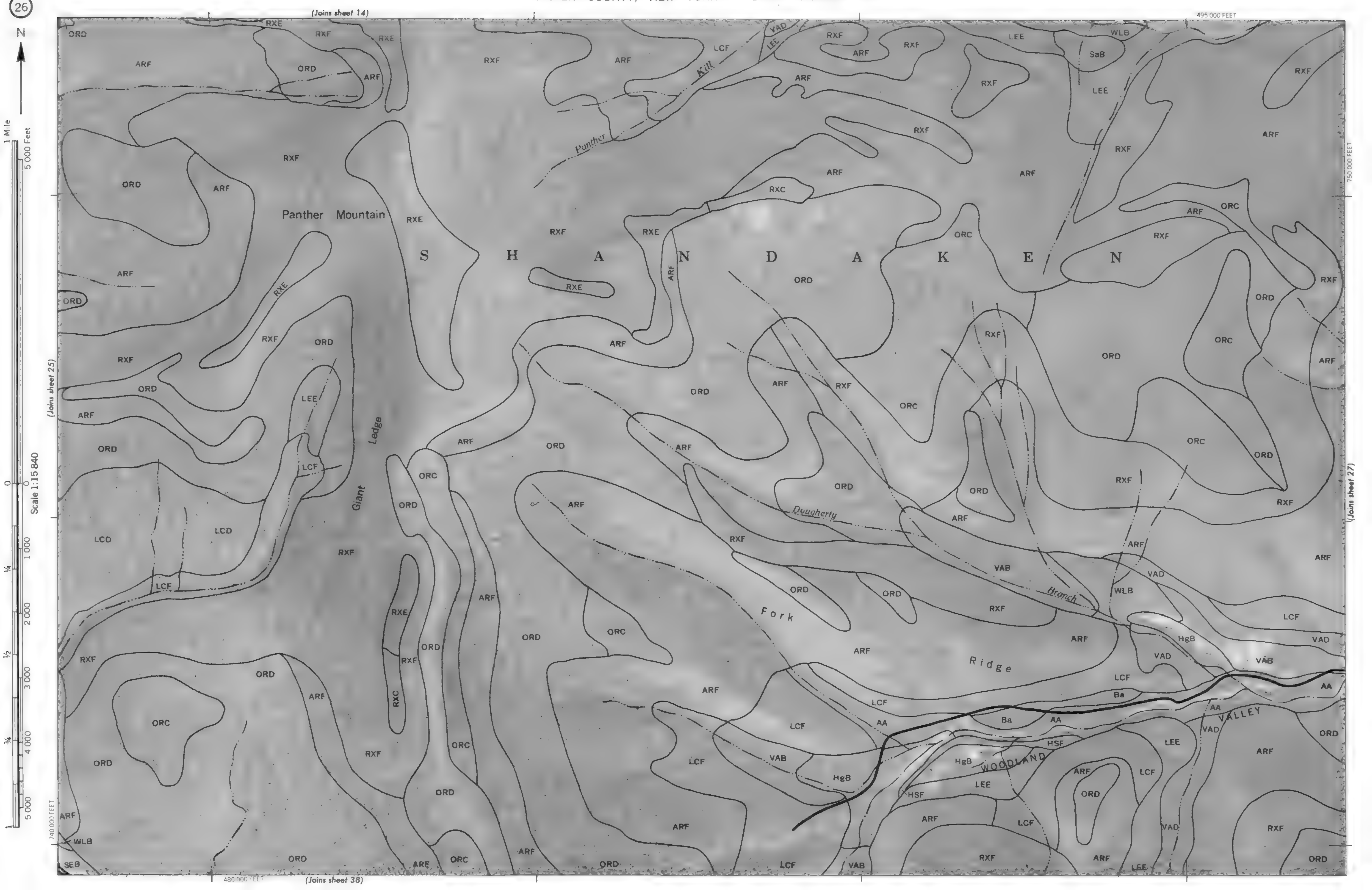

(Joins inset, sheet 21)
(Joins sheet 21)
(Joins sheet 23)
(Joins sheet 34)
415 000 FEET
750 000 FEET
740 000 FEET
400 000 FEET
N
1 Mile
5 000 Feet
Scale 1:15 840
DELAWARE COUNTY
Alder Lake
Alder Creek
Cradle Rock Ridge
H A R D E N B U R G H
Scudder Brook
Beecher Brook
ARF
ORD
ORC
RXC
RXE
RXF
LCD
LCF
LEE
WLB
WOB
SEB
MO
OgB
HgB
HgA
HrB
VAB
VAD
AA
Cc

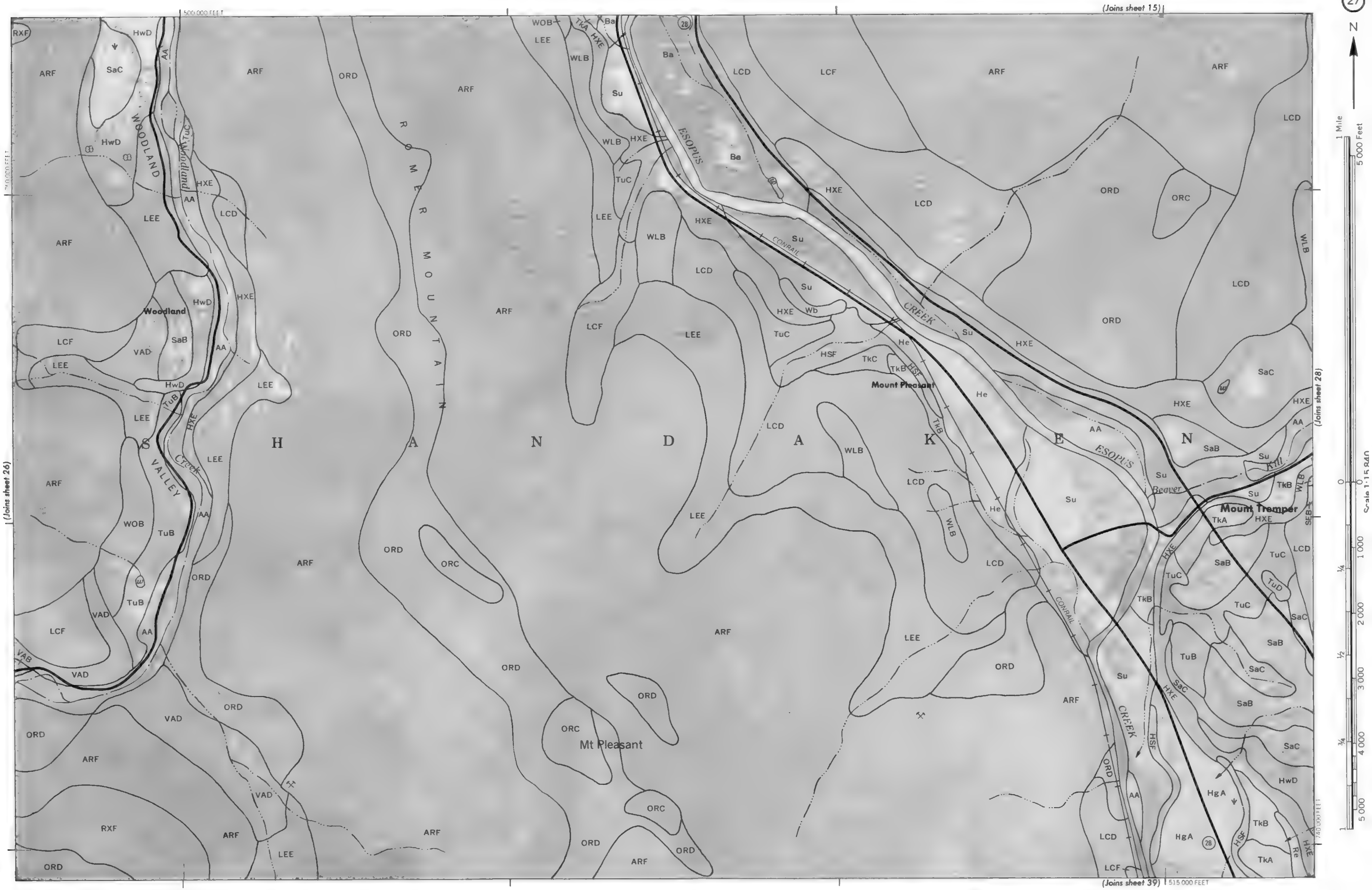

23
N
(Joins sheet 11)
(Joins sheet 22)
(Joins sheet 24)
(Joins sheet 35)
420 000 FEET
750 000 FEET
435 000 FEET
H A R D E N B U R G H
MILL BROOK RIDGE
Balsam Lake Mountain
Beecher Lake
Clark Hollow
Mill Brook
Woodpecker Ridge
Black Brook
Youngs Hollow
Gulf of Mexico Brook
1 Mile
5 000 Feet
Scale 1:15 840

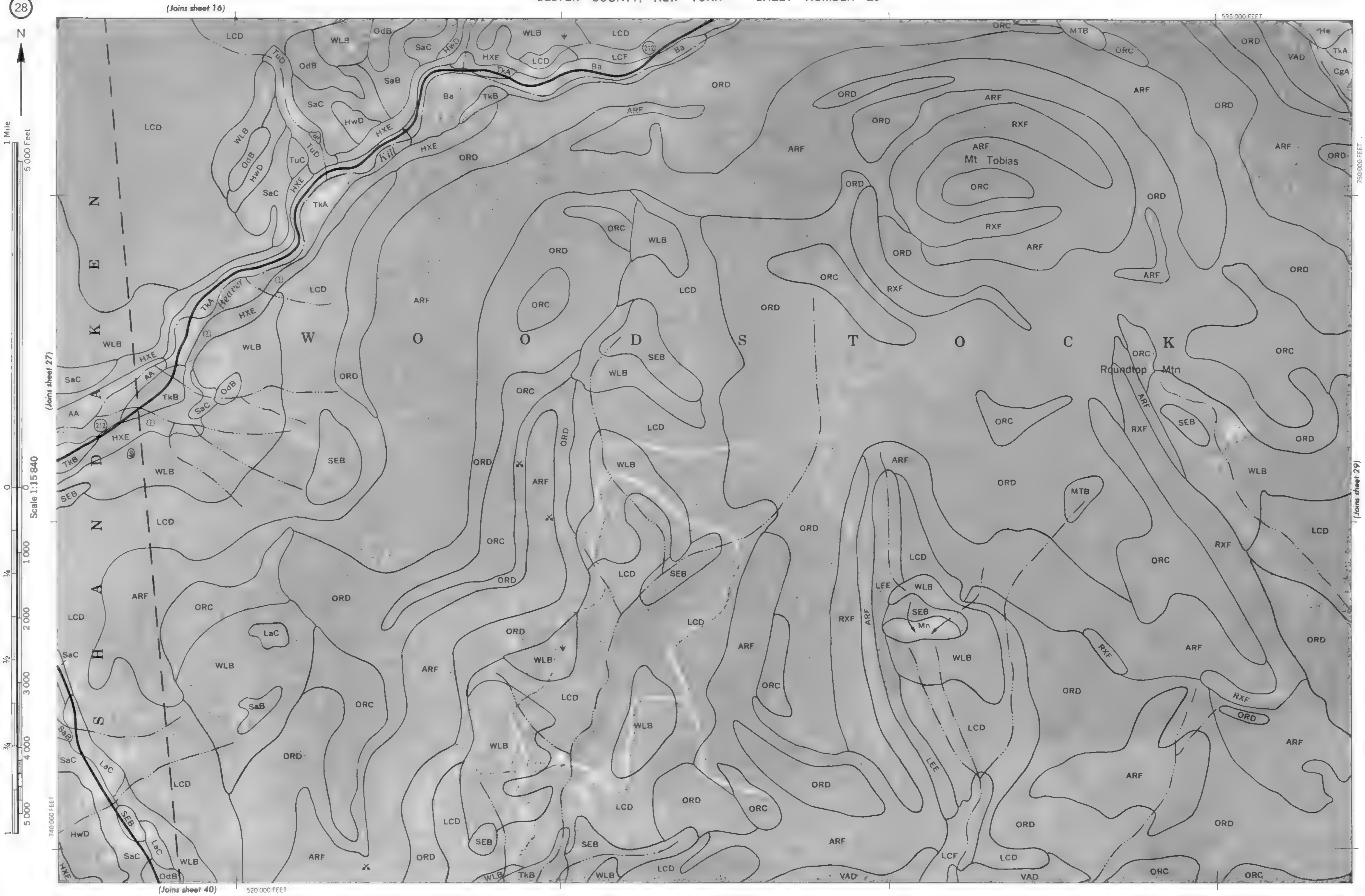

24
N
(Joins sheet 12)
(Joins sheet 23)
(Joins sheet 25)
(Joins sheet 36)
Scale 1:15 840
1 Mile
5 000 Feet
HARDENBURGH
SHANDAKEN
Eagle Mountain
Graham Mountain
Turner Hollow
Drury Hollow
Dry Brook
Shandaken Brook
Flatiron Brook
DENNING

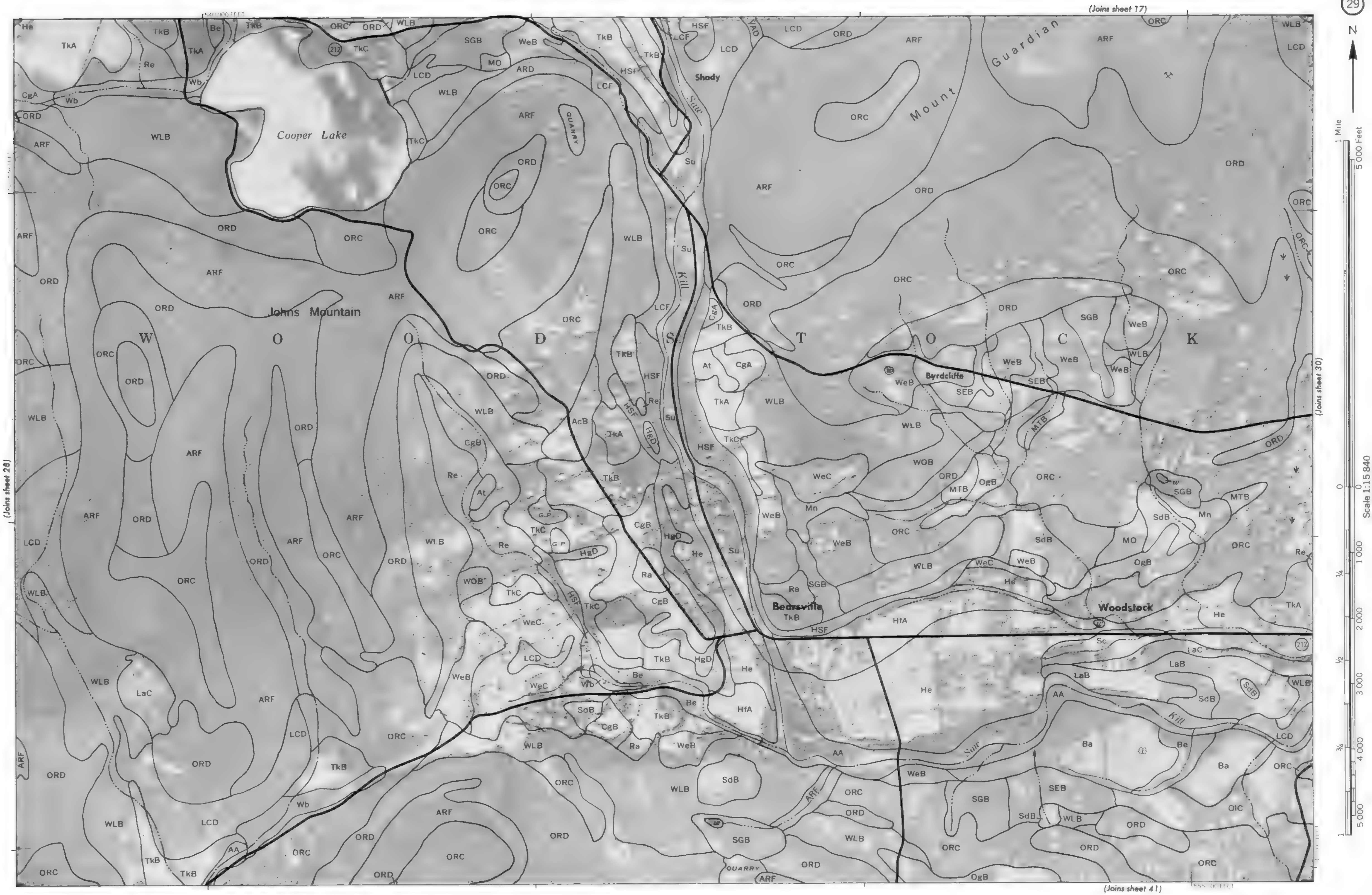


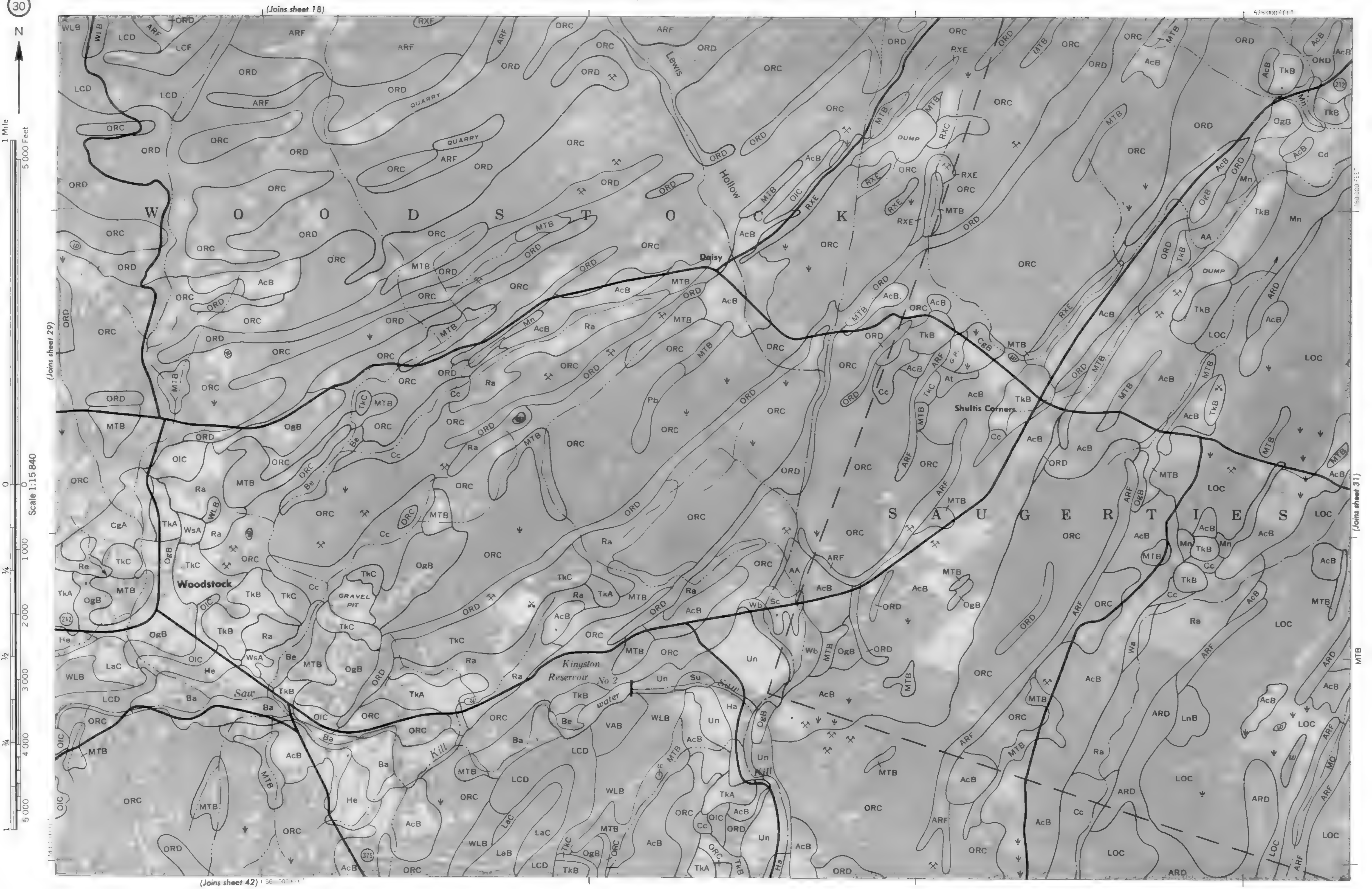
25
N
(Joins sheet 13)
(Joins sheet 24)
(Joins sheet 26)
(Joins sheet 37)
Oliverea
Bushkill
Esopus
Creek
Elk
Little
Peck
Hollow
SHANDAKEN
BIG INDIAN HOLLOW
Esopus
Creek
1 Mile
5 000 Feet
Scale 1:15 840
ARF
ORD
ORC
RXF
RXE
LCD
LCF
WLB
VAB
VAD
AA
SEB
HgB
HgC
HwD
Ba
LEE

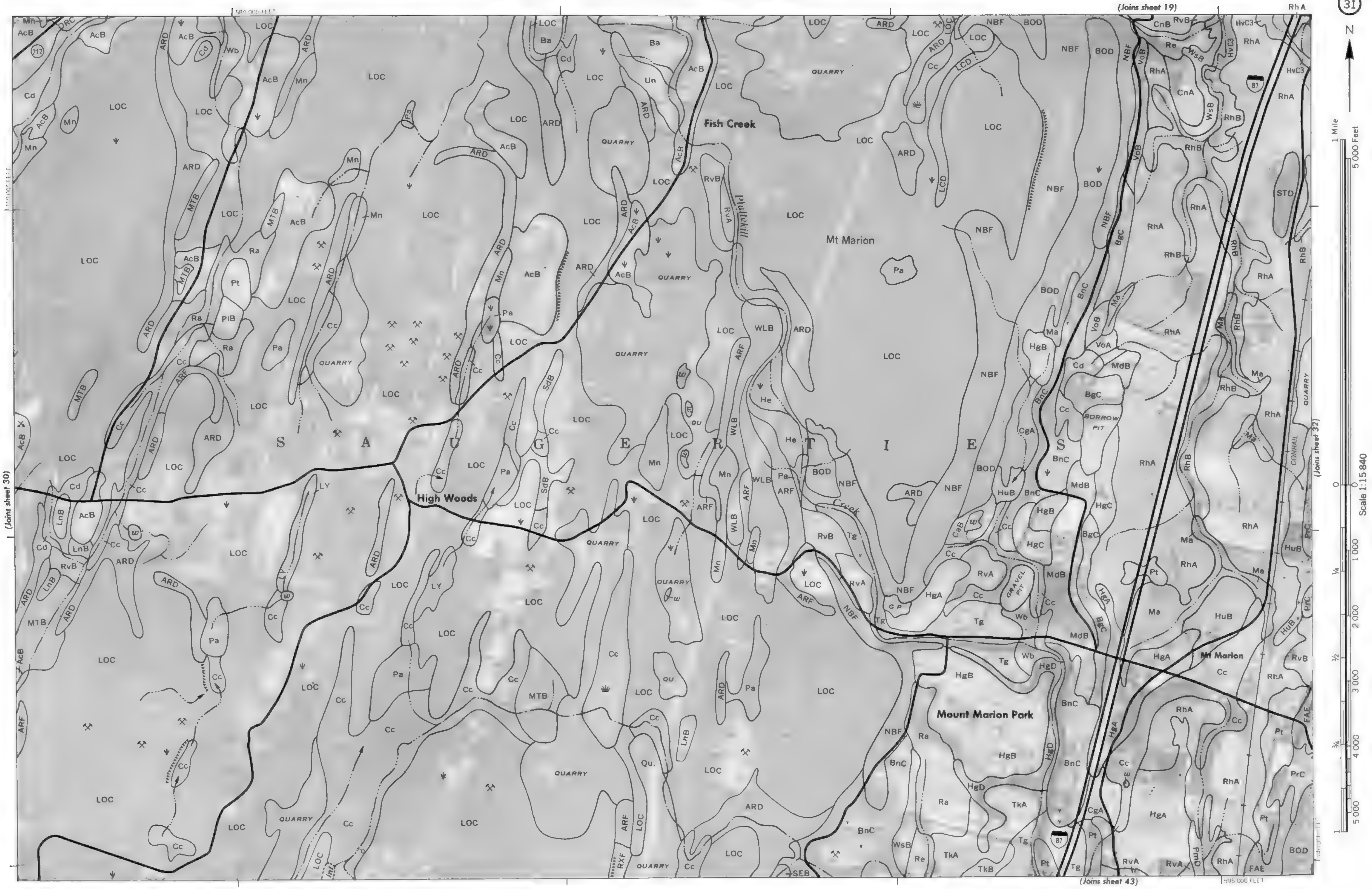

26
N
(Joins sheet 14)
(Joins sheet 25)
(Joins sheet 27)
(Joins sheet 38)
495 000 FEET
750 000 FEET
740 000 FEET
480 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
Panther Mountain
Panther
Kill
S H A N D A K E N
Giant Ledge
Dougherty
Branch
Fork Ridge
WOODLAND VALLEY
ORD
ARF
RXF
RXE
ORC
RXC
LEE
LCF
LCD
WLB
SaB
VAD
VAB
HgB
Ba
AA
HSF
SEB

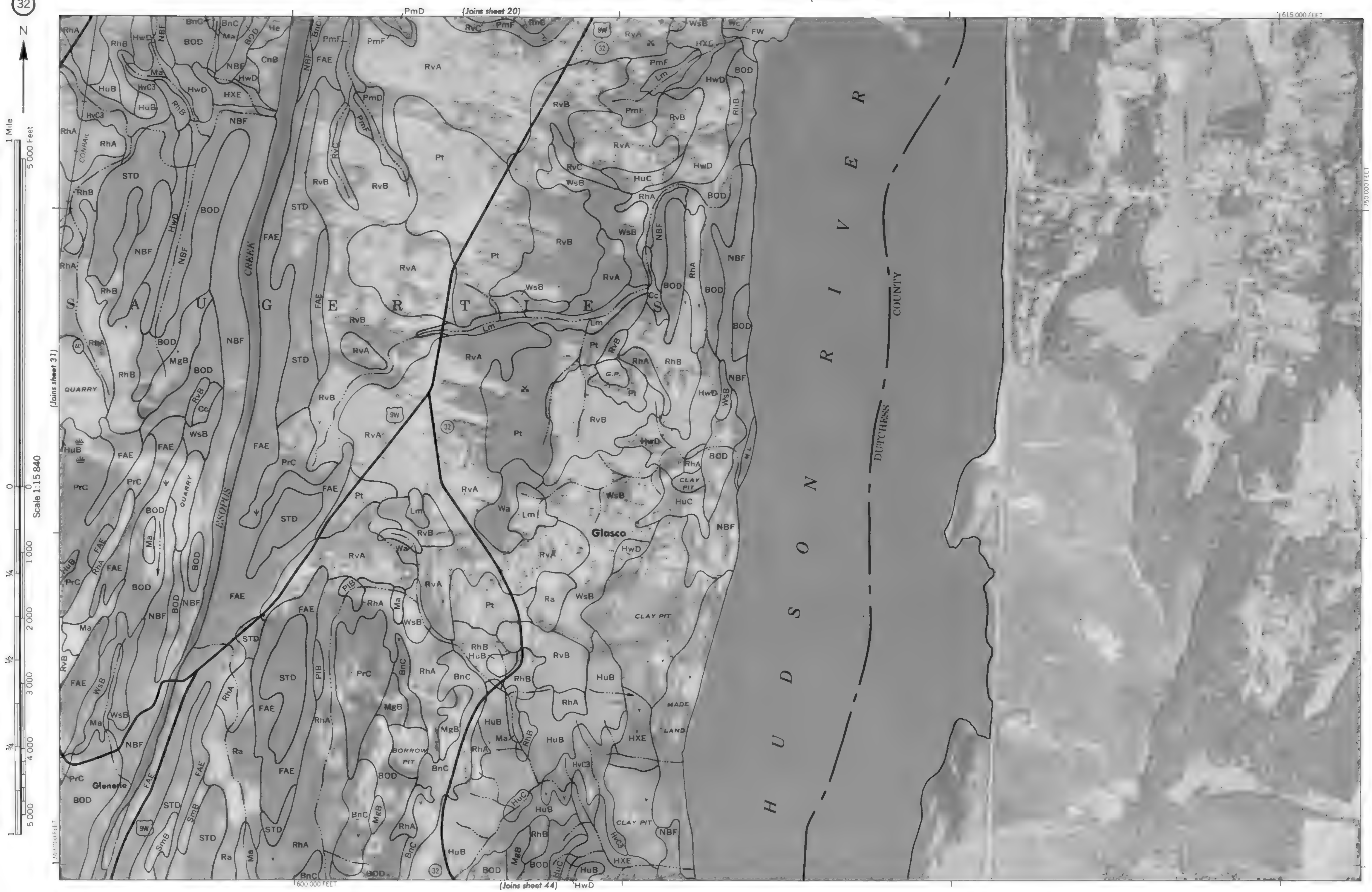

27
(Joins sheet 15)
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 39)
500 000 FEET
515 000 FEET
N
1 Mile
5 000 Feet
Scale 1:15 840
SHANDAKEN
ROMER MOUNTAIN
Woodland
WOODLAND VALLEY
Woodland Creek
ESOPUS CREEK
CONRAIL
Mount Pleasant
Mt Pleasant
Mount Tremper
Beaver Kill
ARF
ORD
ORC
LCD
LCF
LEE
WLB
HXE
HSF
Su
Ba
He
AA
SaC
SaB
HwD
TuB
TuC
TuD
TkA
TkB
TkC
WOB
VAD
VAB
RXF
HgA
SEB
Re
Wb

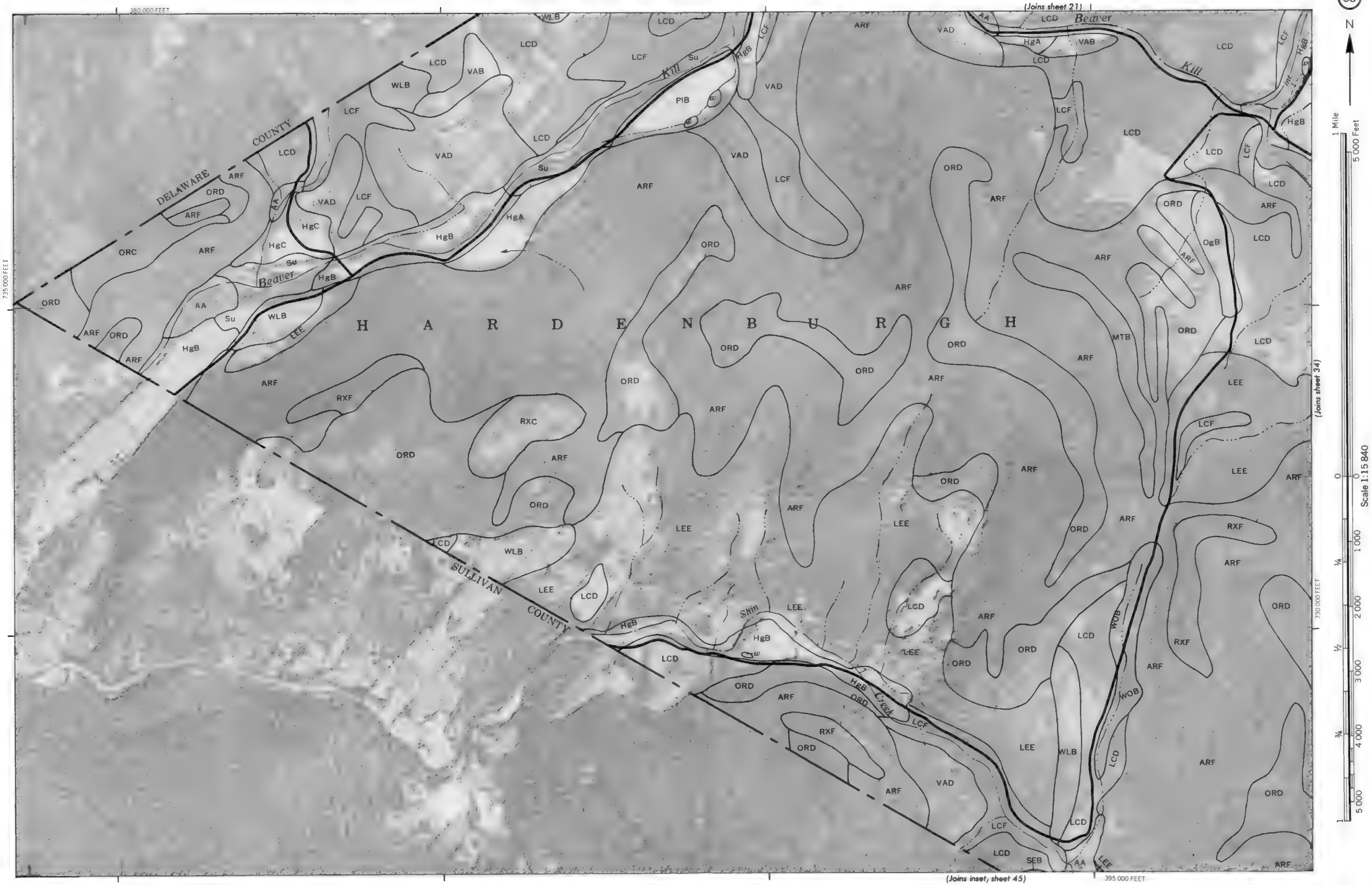

28
N
(Joins sheet 16)
(Joins sheet 27)
(Joins sheet 29)
(Joins sheet 40)
1 Mile
5 000 Feet
Scale 1:15 840
535 000 FEET
750 000 FEET
740 000 FEET
520 000 FEET
SHANDAKEN
WOODSTOCK
Mt Tobias
Roundtop Mtn
Beaver Kill
212

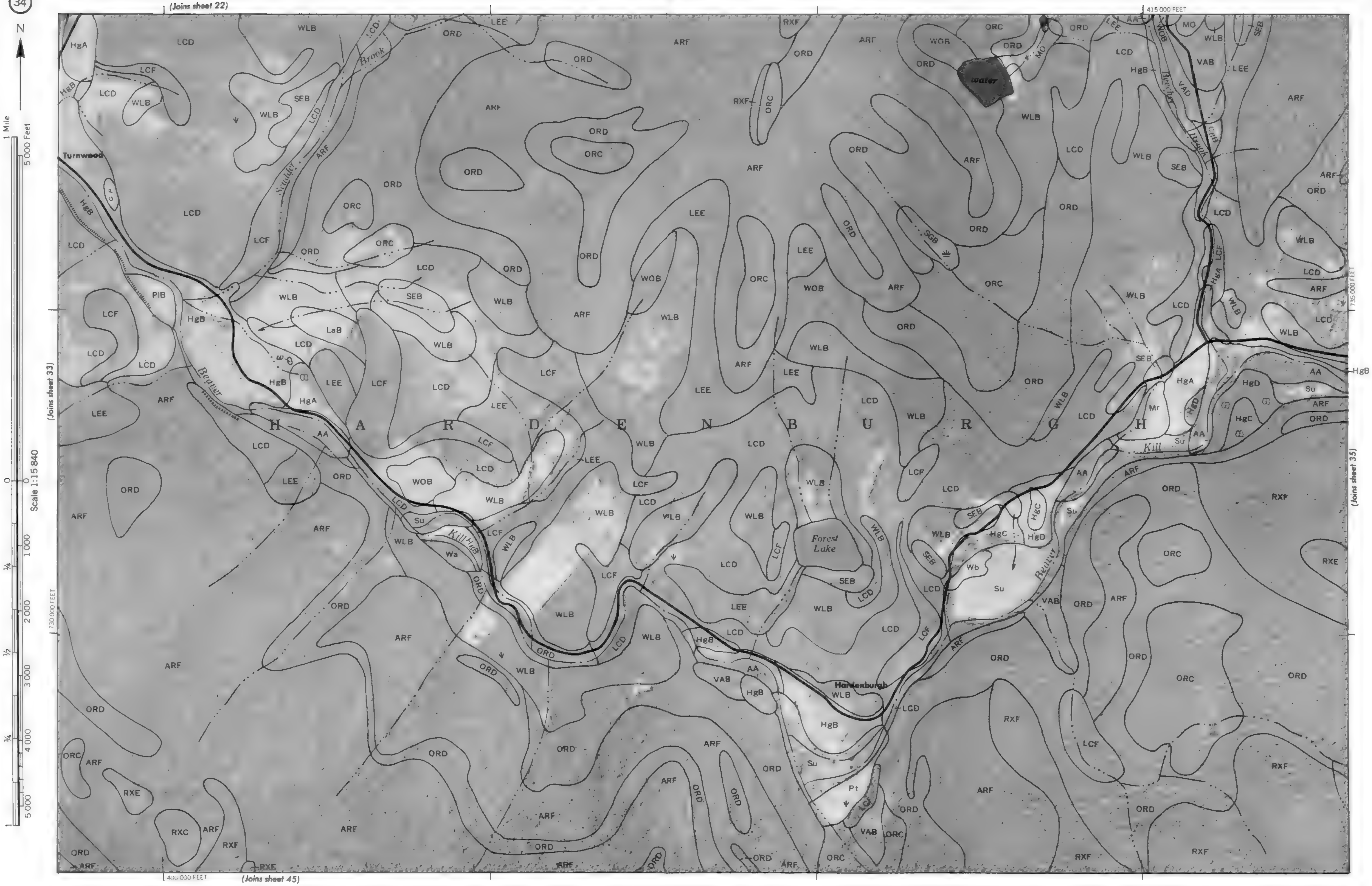

29
N
(Joins sheet 17)
(Joins sheet 28)
(Joins sheet 30)
(Joins sheet 41)
Cooper Lake
Johns Mountain
Mount Guardian
Shady
Byrdcliffe
Bearsville
Woodstock
W O O D S T O C K
Saw Kill
QUARRY
212
1 Mile
5 000 Feet
Scale 1:15 840

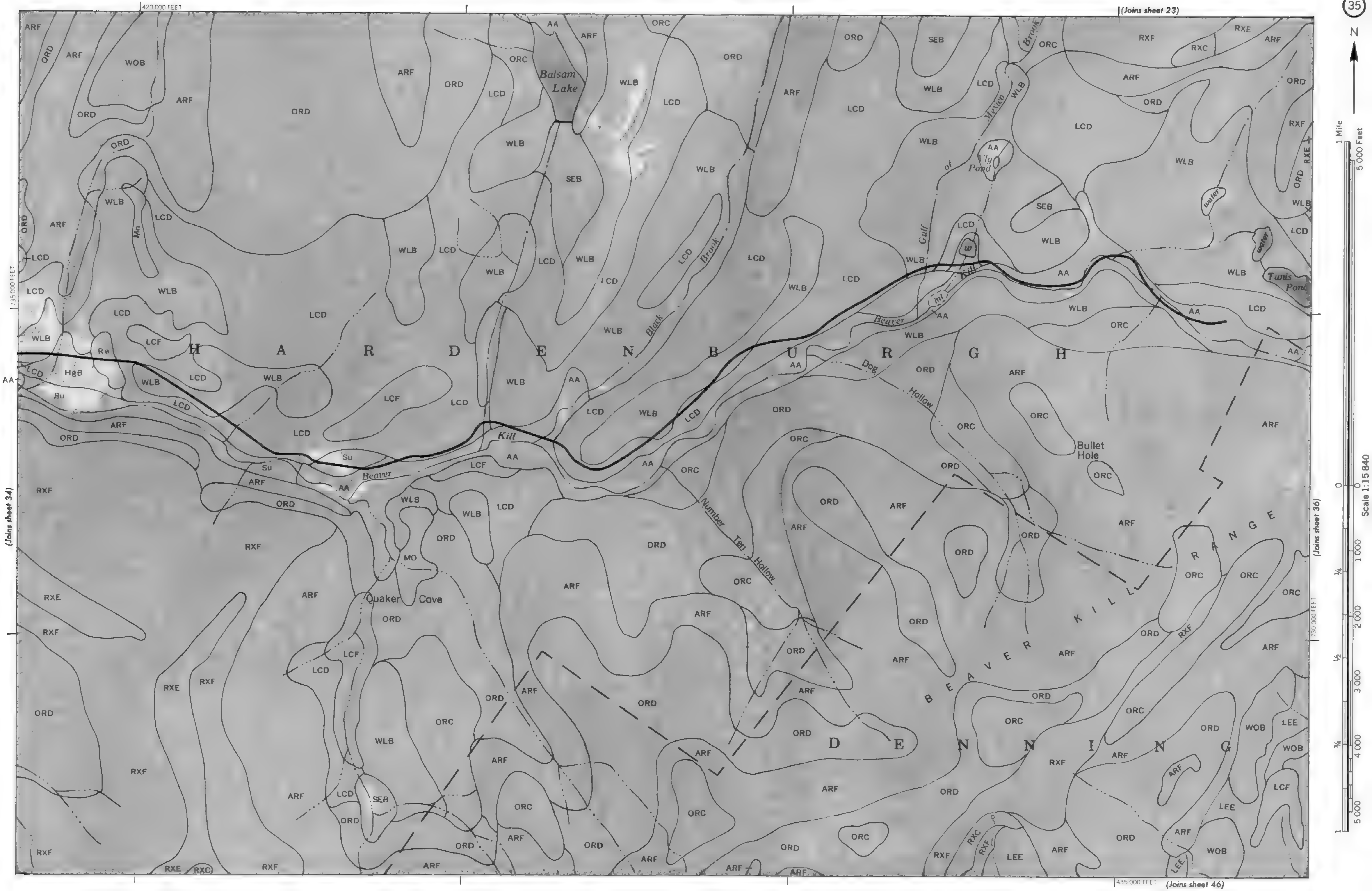

(Joins sheet 18)
(Joins sheet 29)
(Joins sheet 31)
(Joins sheet 42)
N
1 Mile
5 000 Feet
Scale 1:15 840
W O O D S T O C K
S A U G E R T I E S
Woodstock
Daisy
Shultis Corners
Lewis
Hollow
Kingston
Reservoir No 2
Saw
Kill
QUARRY
DUMP
GRAVEL PIT

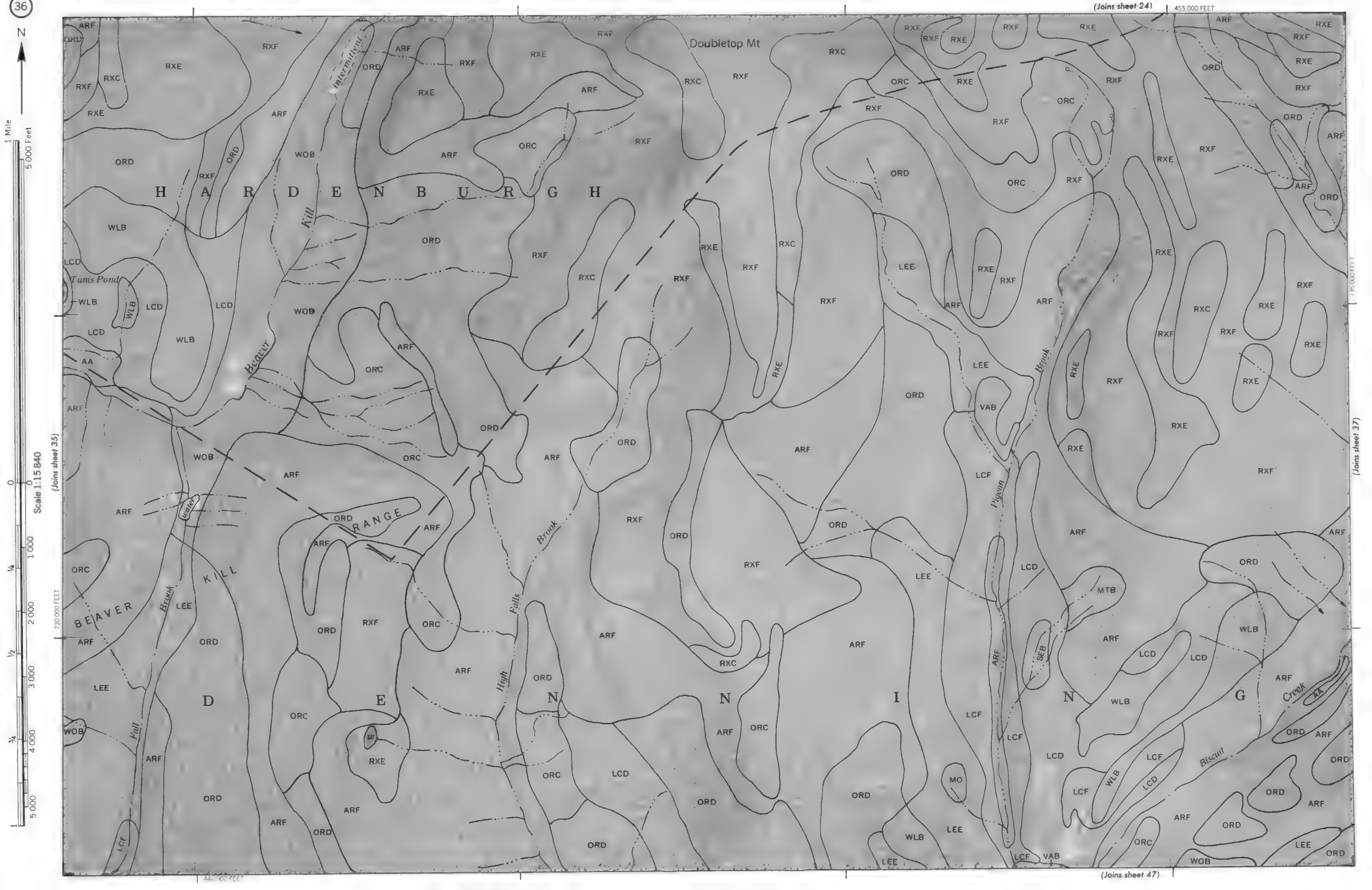

(Joins sheet 19)
(Joins sheet 30)
(Joins sheet 32)
(Joins sheet 43)
31
N
SAUGERTIES
Fish Creek
Mt Marion
High Woods
Mount Marion Park
Plattekill
Creek
QUARRY
BORROW PIT
GRAVEL PIT
CONRAIL
1 Mile
5 000 Feet
Scale 1:15 840
580 000 FEET
595 000 FEET

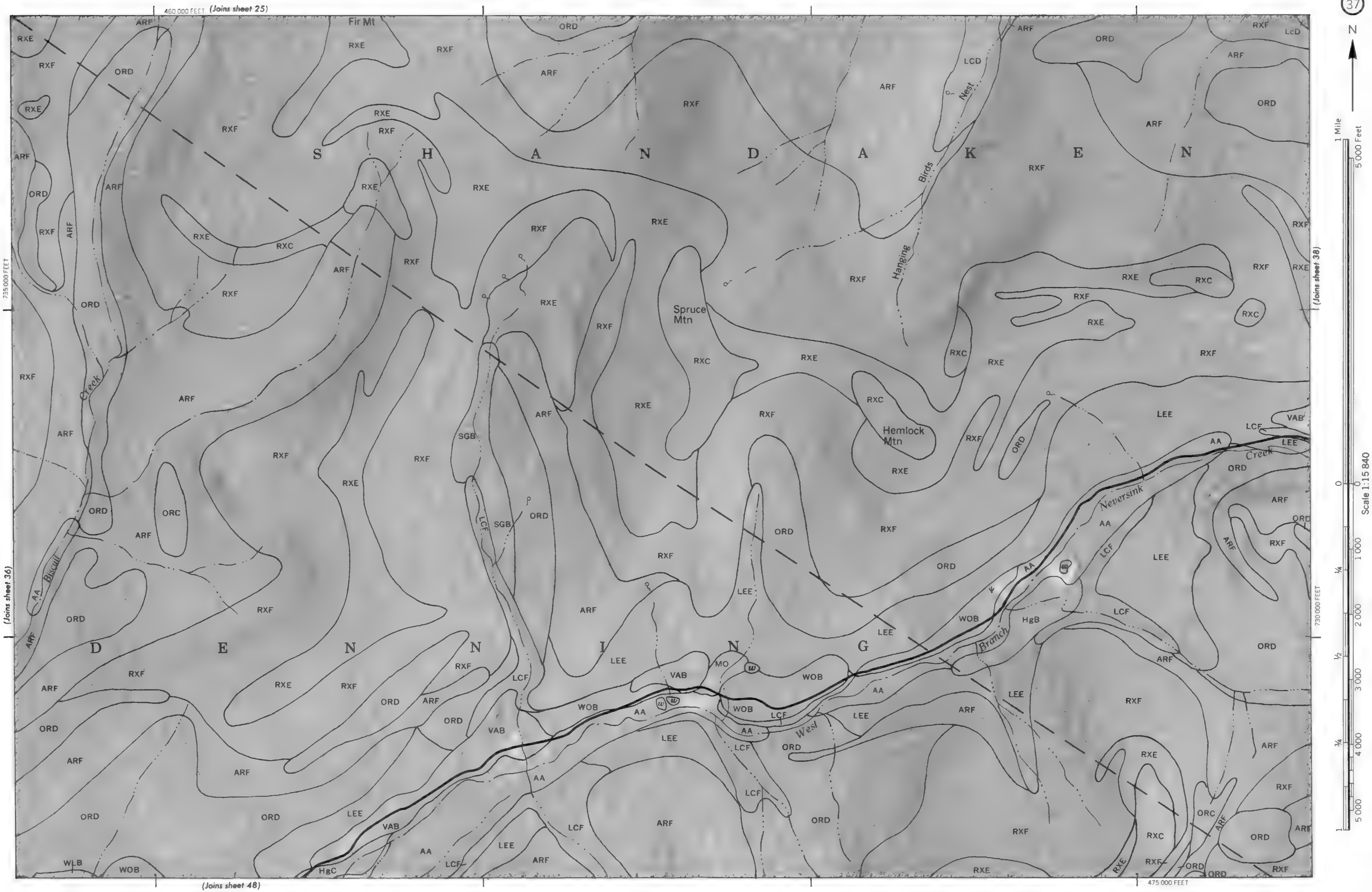

32
N
(Joins sheet 20)
(Joins sheet 31)
(Joins sheet 44)
Scale 1:15 840
1 Mile
5 000 Feet
615 000 FEET
750 000 FEET
600 000 FEET
S A U G E R T I E S
HUDSON RIVER
DUTCHESS COUNTY
ESOPUS CREEK
Glasco
Glenerie
QUARRY
CLAY PIT
BORROW PIT
MADE LAND
CONRAIL

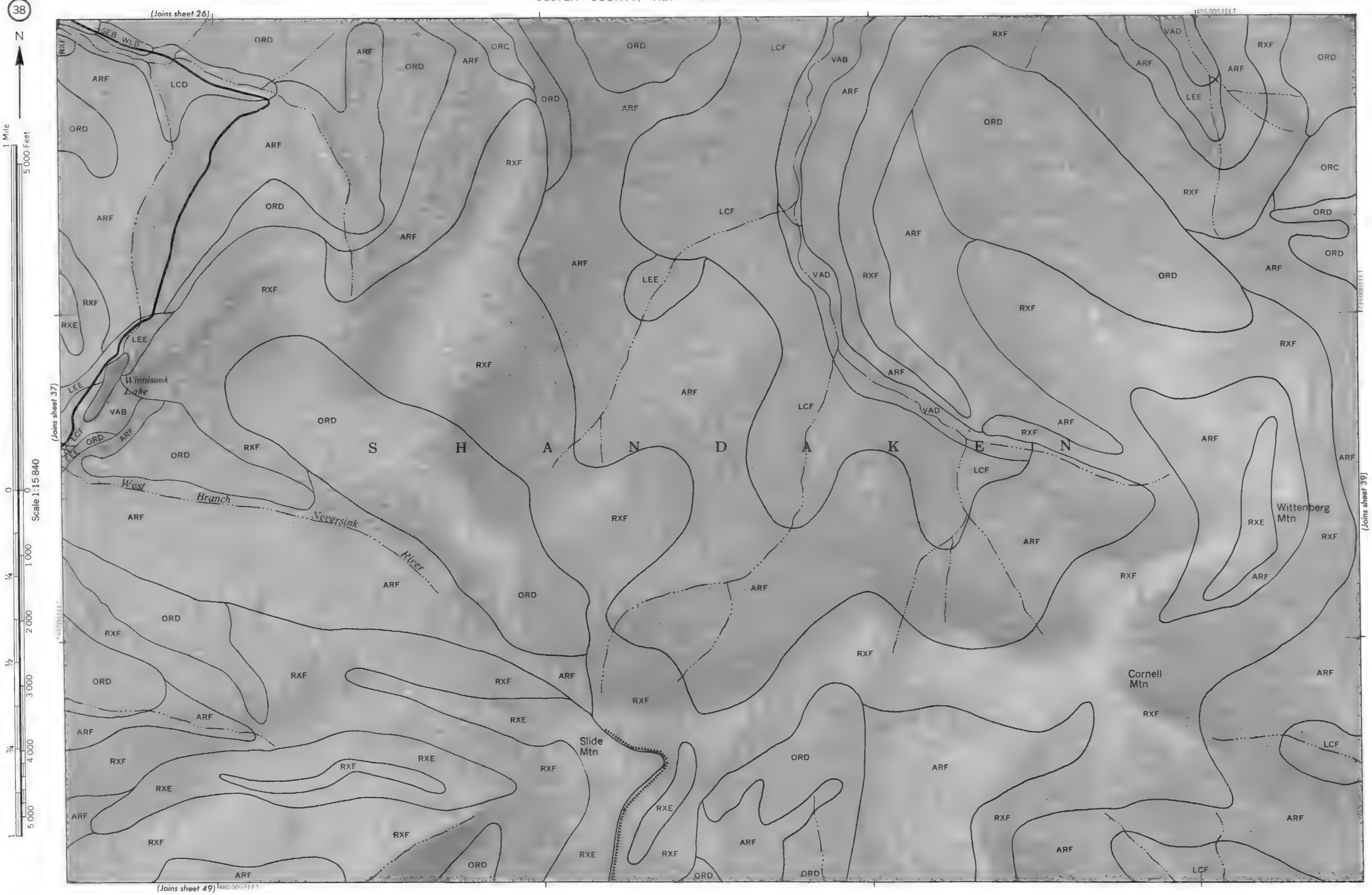

33
N
(Joins sheet 21)
(Joins sheet 34)
(Joins inset, sheet 45)
380 000 FEET
395 000 FEET
735 000 FEET
730 000 FEET
H A R D E N B U R G H
DELAWARE COUNTY
SULLIVAN COUNTY
Beaver Kill
Shin Creek
1 Mile
5 000 Feet
Scale 1:15 840

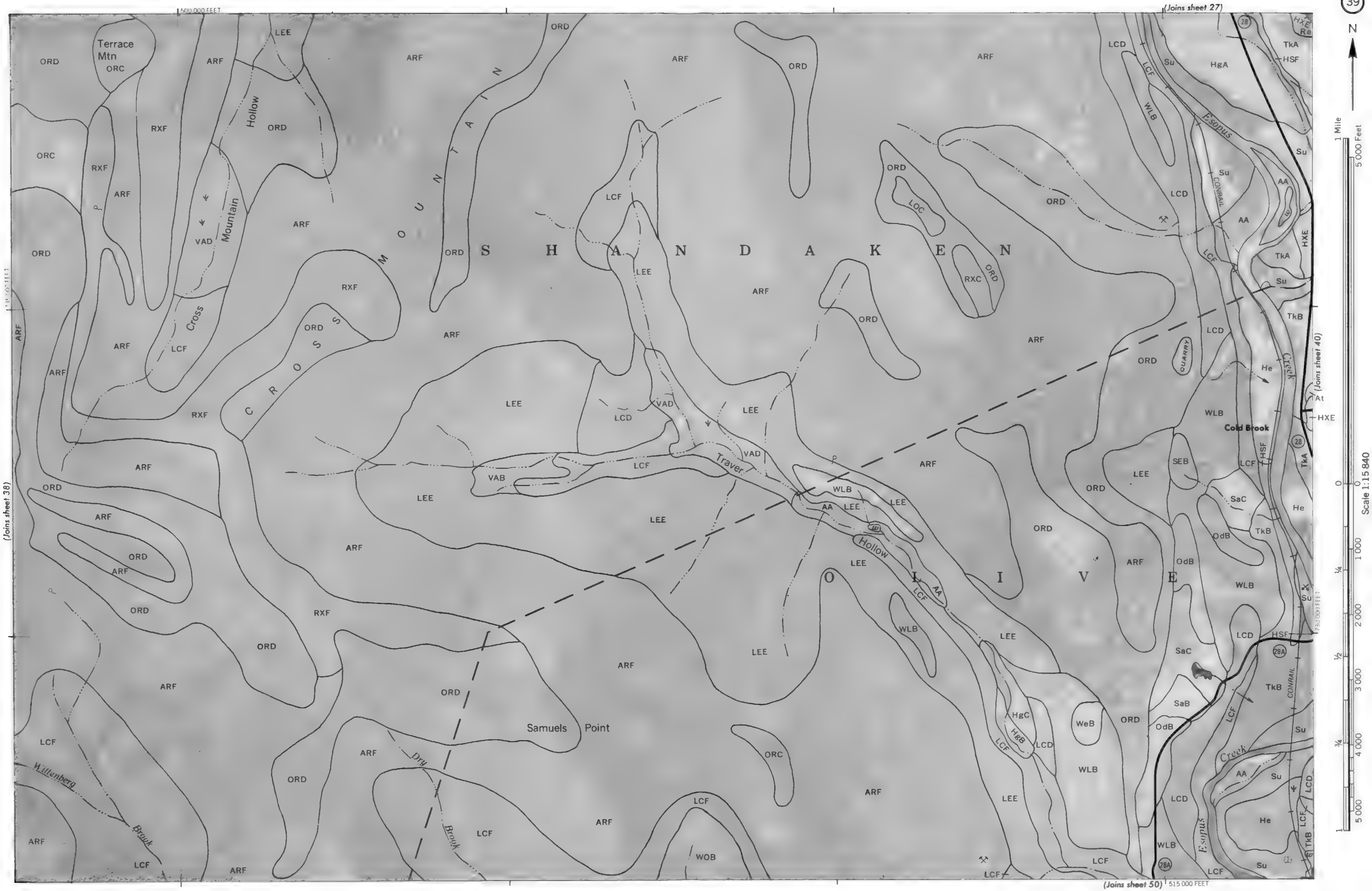

N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 22)
(Joins sheet 33)
(Joins sheet 35)
(Joins sheet 45)
415 000 FEET
400 000 FEET
735 000 FEET
730 000 FEET
Turnwood
Hardenburgh
H A R D E N B U R G H
Scudder Brook
Beaver Kill
Beecher Brook
Forest Lake
Water
HgA
HgB
HgC
HgD
LCD
LCF
WLB
ORD
ORC
ARF
LEE
SEB
SGB
WOB
RXF
RXE
RXC
PIB
LaB
AA
Su
Wa
Wb
Mr
MO
VAB
VAD
Pt
GP
CPB


35
N
(Joins sheet 23)
(Joins sheet 34)
(Joins sheet 36)
(Joins sheet 46)
420 000 FEET
435 000 FEET
735 000 FEET
730 000 FEET
Balsam Lake
Black Brook
Gull of Mexico Brook
Vly Pond
Tunis Pond
water
Beaver Kill
Dog Hollow
Number Ten Hollow
Bullet Hole
Quaker Cove
H A R D E N B U R G H
B E A V E R K I L L R A N G E
D E N N I N G
1 Mile
5 000 Feet
Scale 1:15 840

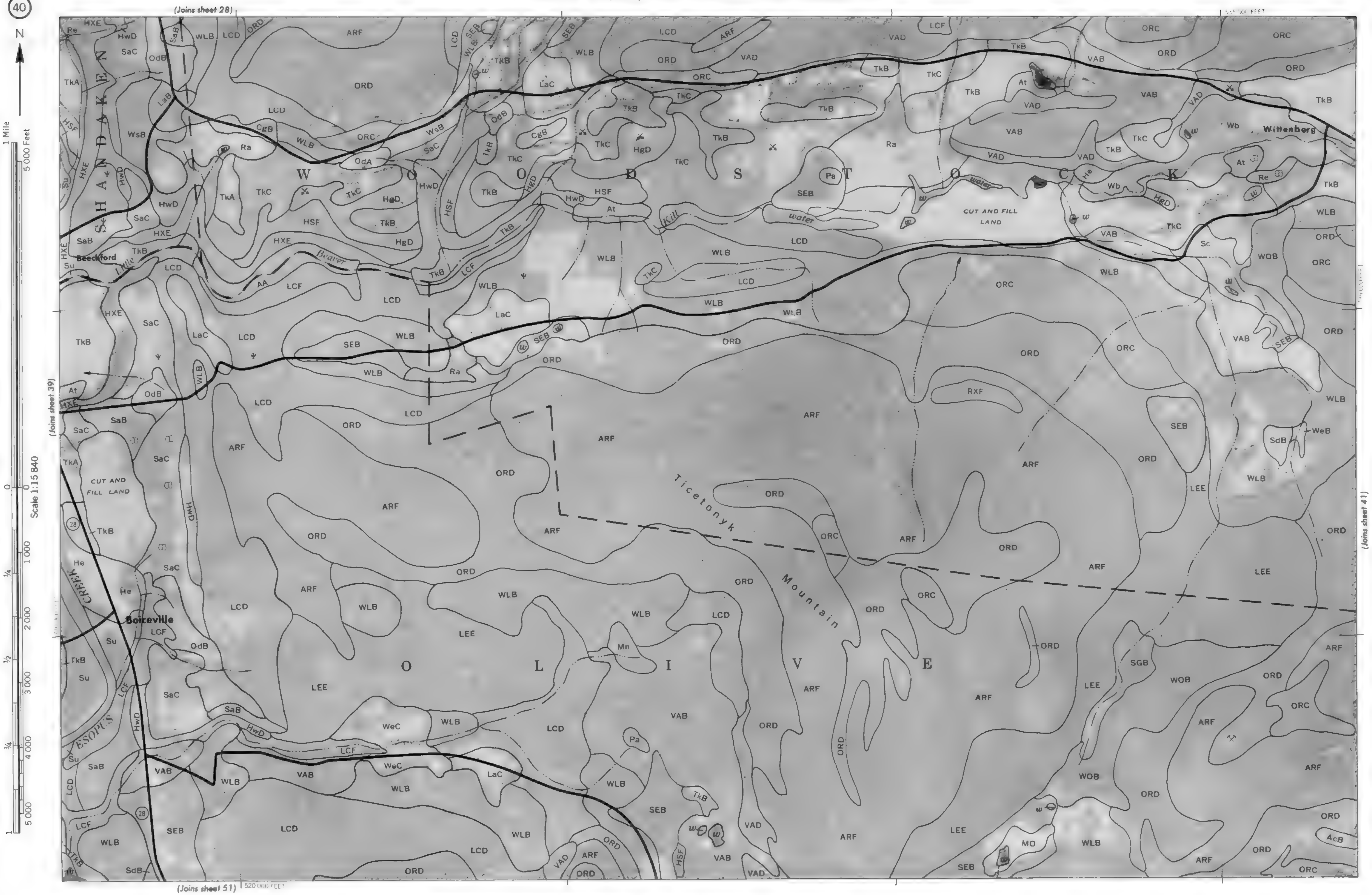

36
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 24)
(Joins sheet 35)
(Joins sheet 37)
(Joins sheet 47)
455 000 FEET
730 000 FEET
Doubletop Mt
H A R D E N B U R G H
R A N G E
D E N N I N G
Tunis Pond
Beaver Kill
Intermittent
Beaver Brook Kill
Fall Brook
High Falls Brook
Pigeon Brook
Biscuit Creek
water

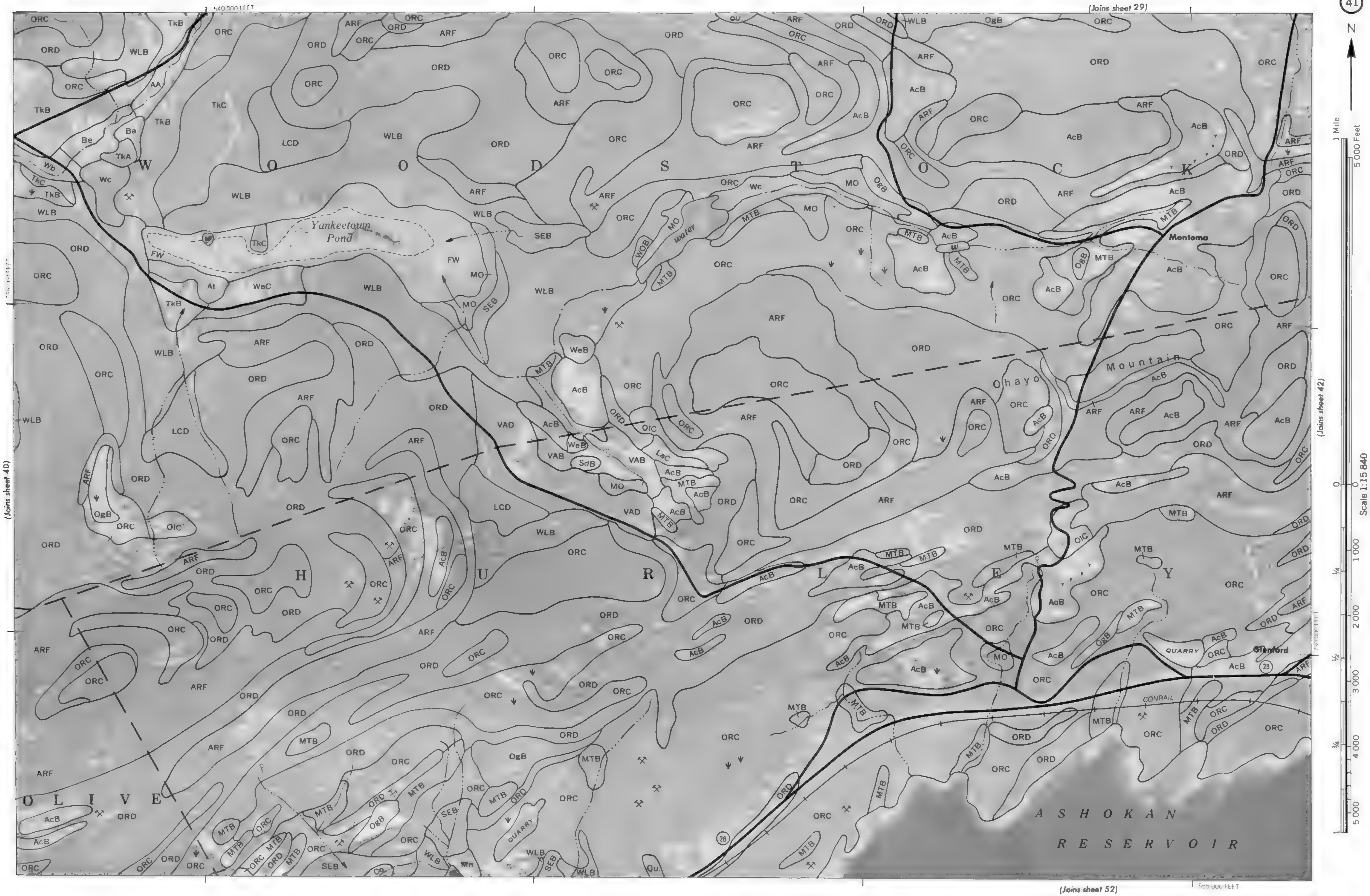

37
N
460 000 FEET (Joins sheet 25)
(Joins sheet 36)
(Joins sheet 38)
(Joins sheet 48)
735 000 FEET
730 000 FEET
475 000 FEET
Fir Mt
Spruce Mtn
Hemlock Mtn
S H A N D A K E N
D E N N I N G
Biscuit Creek
Birds Nest
Hanging
Neversink Creek
West Branch
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1

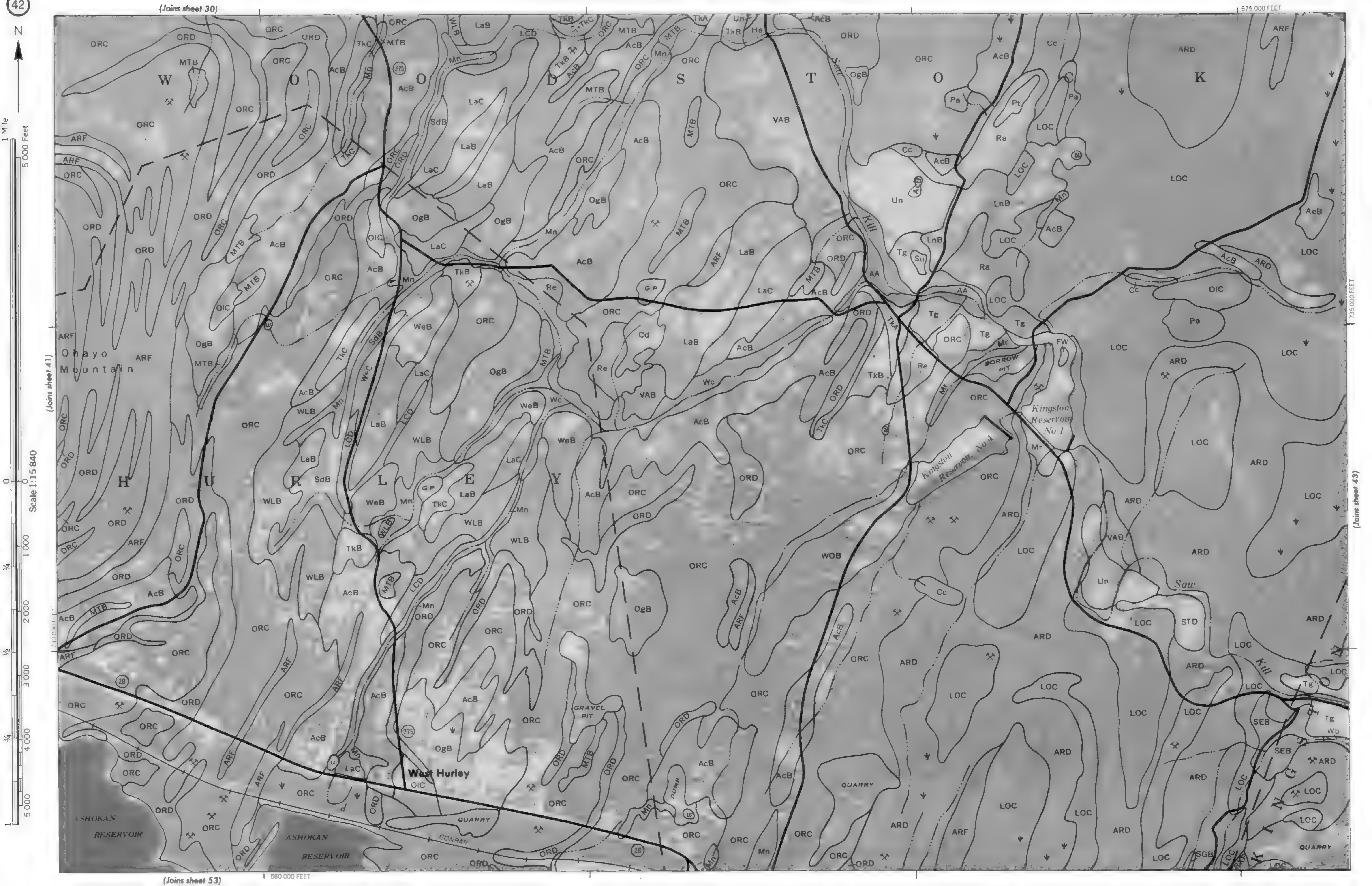

38
N
(Joins sheet 26)
(Joins sheet 37)
(Joins sheet 39)
(Joins sheet 49)
S H A N D A K E N
Winnisook Lake
West Branch Neversink River
Slide Mtn
Cornell Mtn
Wittenberg Mtn
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
½
¾
1
0
1000
2000
3000
4000
5000

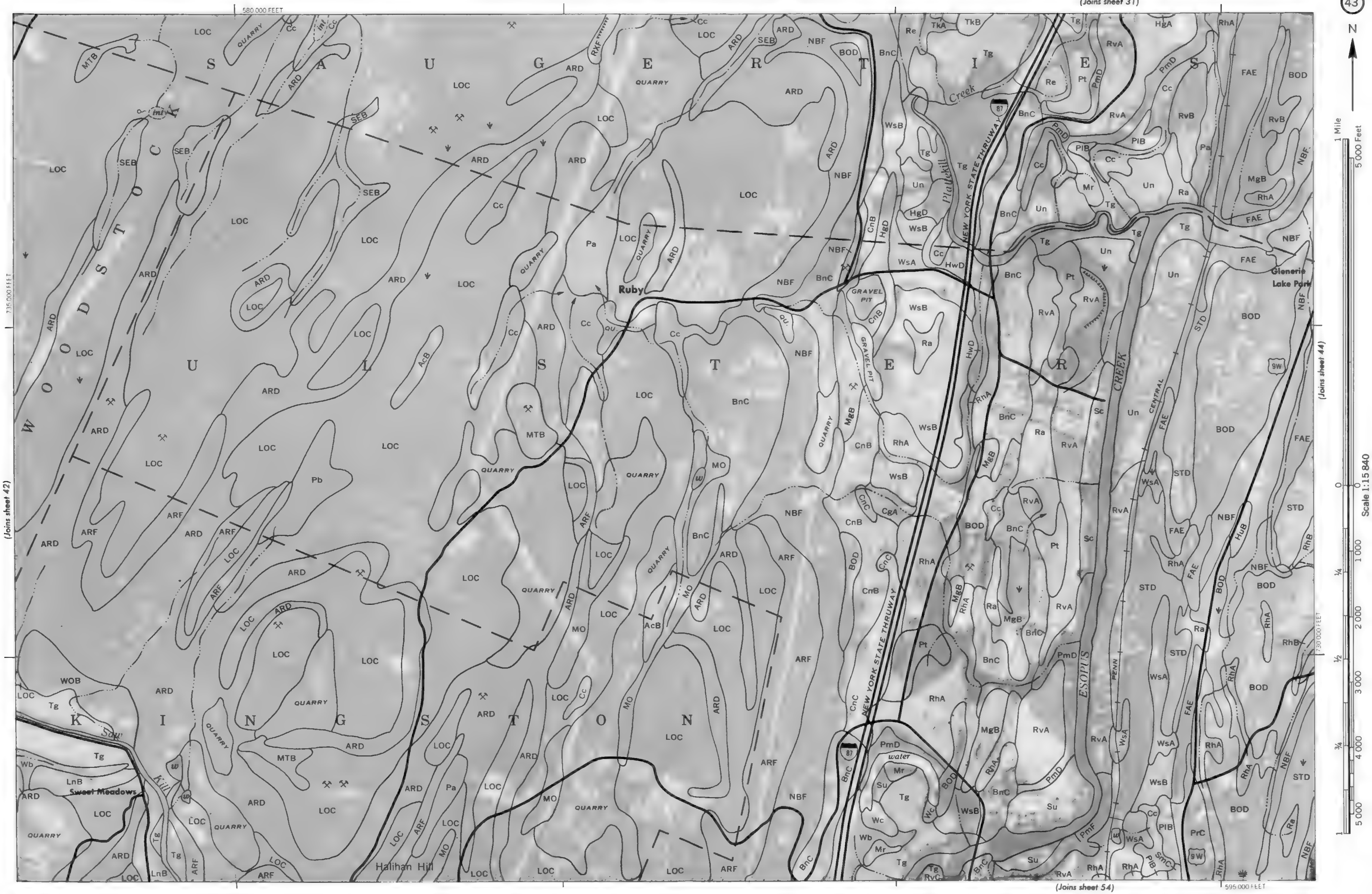

39
N
(Joins sheet 27)
(Joins sheet 38)
(Joins sheet 40)
(Joins sheet 50)
500 000 FEET
515 000 FEET
Terrace Mtn
Hollow
Cross Mountain
C R O S S   M O U N T A I N
S H A N D A K E N
O L I V E
Traver Hollow
Samuels Point
Dry Brook
Wittenberg Brook
Esopus Creek
Cold Brook
CONRAIL
QUARRY
28
28A
ORD
ORC
ARF
RXF
LEE
VAD
LCF
LCD
VAB
LOC
RXC
WLB
AA
SEB
SaC
SaB
OdB
WeB
HgC
HgB
WOB
Su
HgA
TkA
TkB
HSF
HXE
He
At
Re
Scale 1:15 840
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000

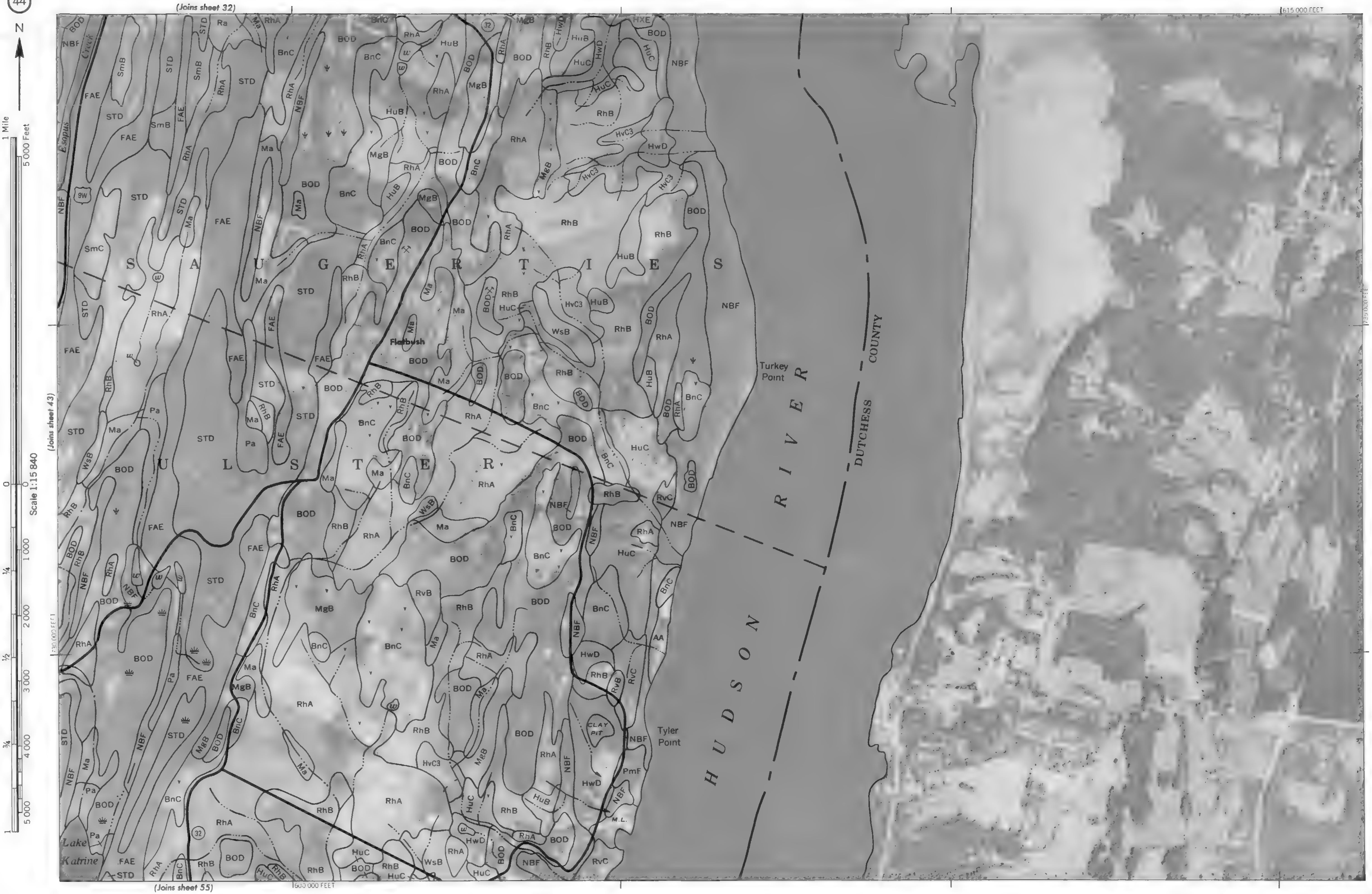
ULSTER COUNTY, NEW YORK — SHEET NUMBER 40

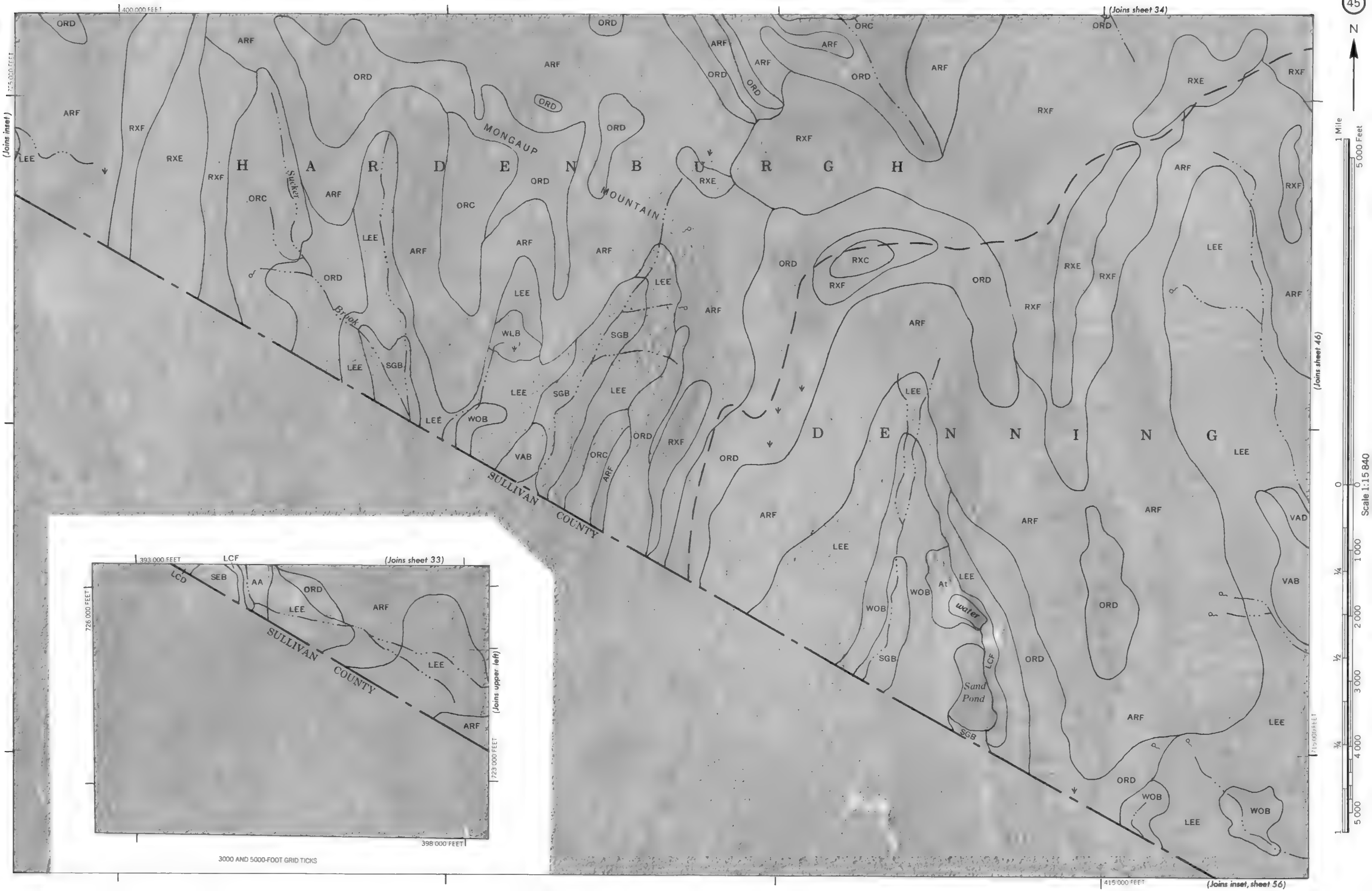


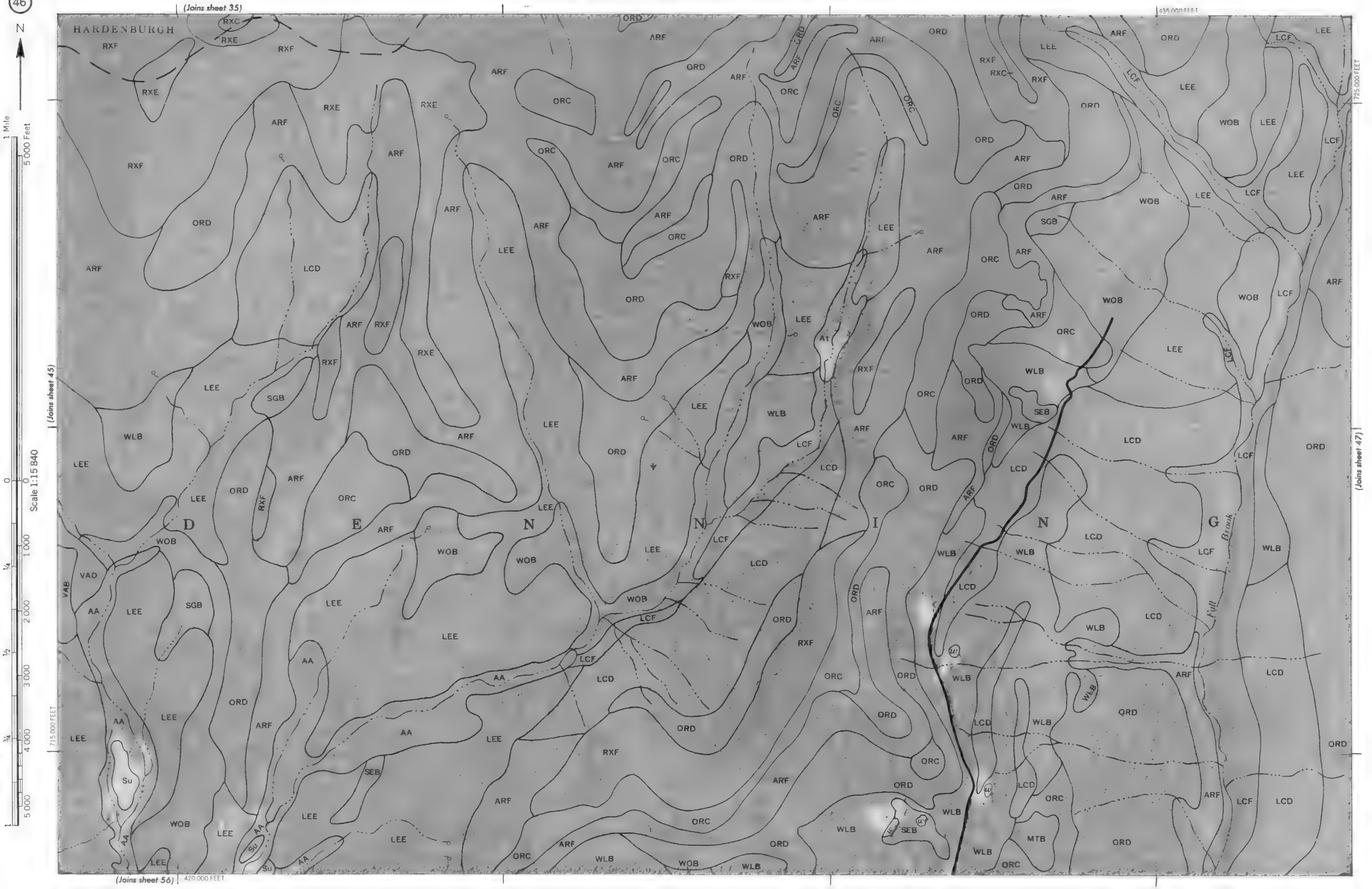

(Joins sheet 29)
(Joins sheet 40)
(Joins sheet 42)
(Joins sheet 52)
540 000 FEET
555 000 FEET
W O O D S T O C K
H U R L E Y
O L I V E
Yankeetown Pond
Ohayo Mountain
Montoma
Glenford
A S H O K A N
R E S E R V O I R
CONRAIL
QUARRY
N
1 Mile
5 000 Feet
Scale 1:15 840

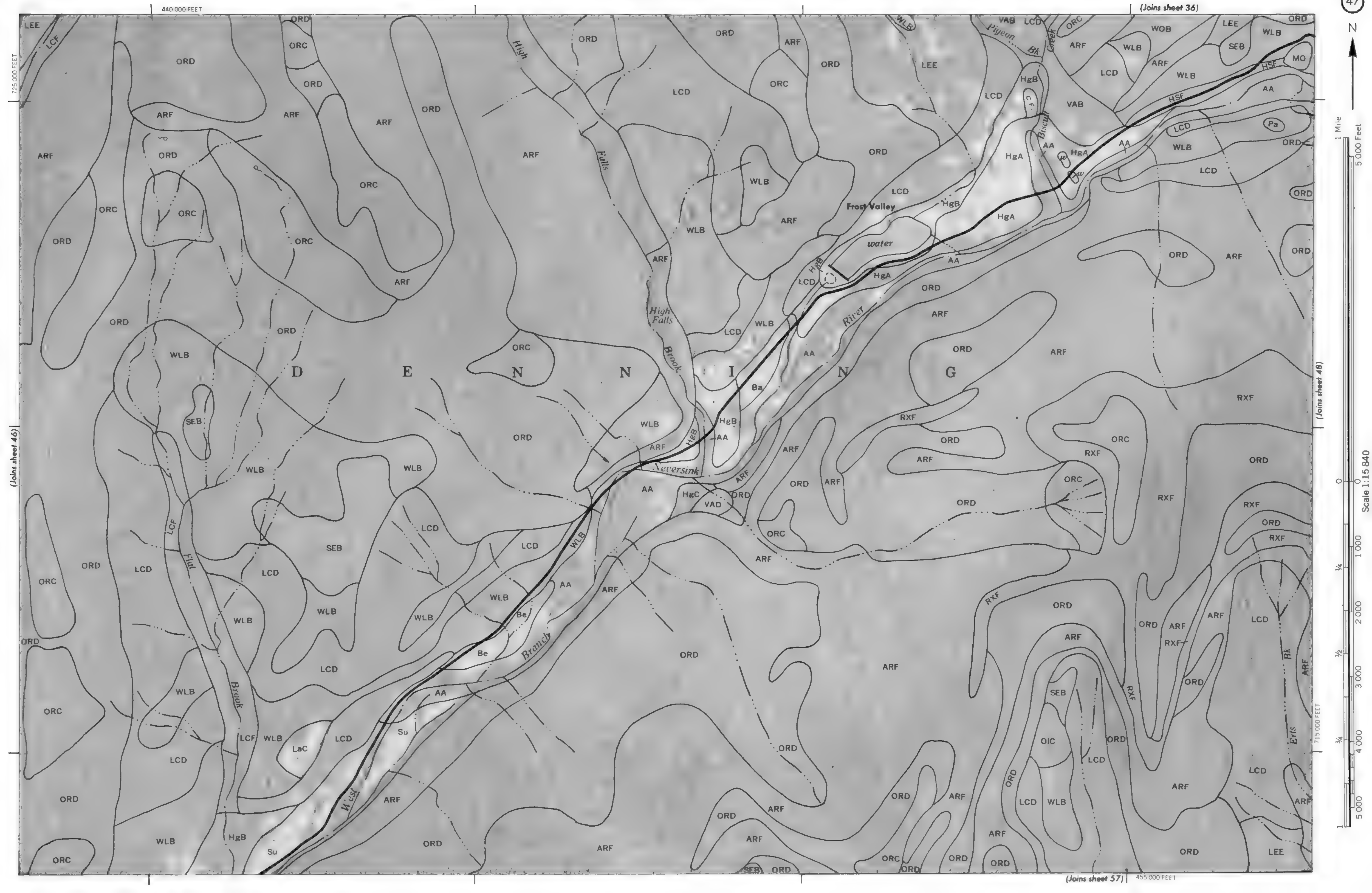

(Joins sheet 30)
(Joins sheet 41)
(Joins sheet 43)
(Joins sheet 53)
N
1 Mile
5 000 Feet
Scale 1:15 840
575 000 FEET
735 000 FEET
560 000 FEET
W O O D S T O C K
H U R L E Y
K I N G S T O N
Ohayo Mountain
Sawkill
Saw Kill
Kingston Reservoir No 1
Kingston Reservoir No 4
West Hurley
ASHOKAN RESERVOIR
BORROW PIT
GRAVEL PIT
QUARRY
DUMP
CONRAIL
375
28

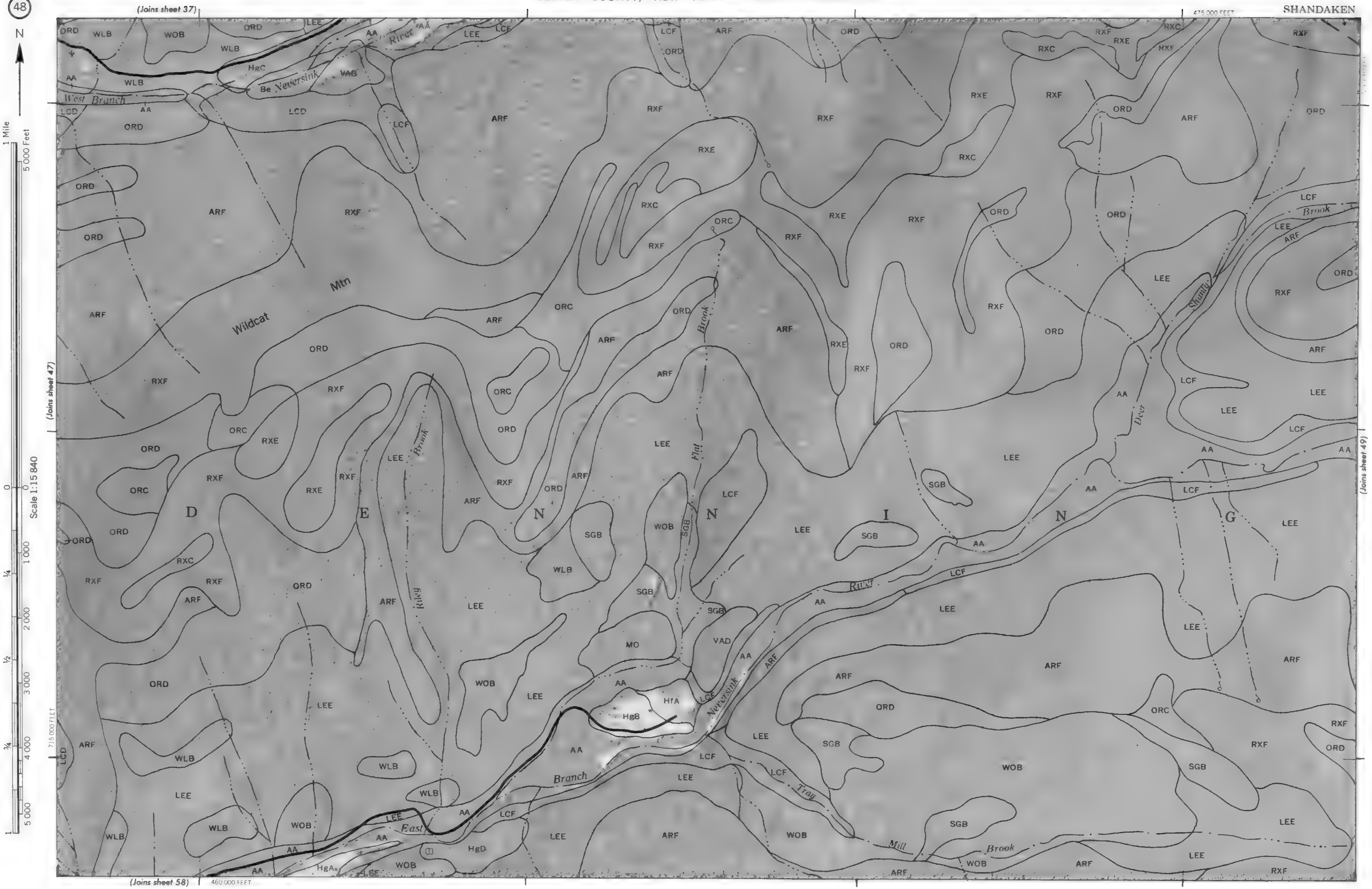

(Joins sheet 31)
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 54)
580 000 FEET
595 000 FEET
735 000 FEET
730 000 FEET
SAUGERTIES
WOODSTOCK
ULSTER
KINGSTON
Ruby
Glenerie Lake Park
Sweet Meadows
Halihan Hill
NEW YORK STATE THRUWAY
ESOPUS CREEK
Plattekill
Creek
Saw Kill
CENTRAL
PENN
QUARRY
GRAVEL PIT
87
9W
N
1 Mile
5 000 Feet
Scale 1:15 840

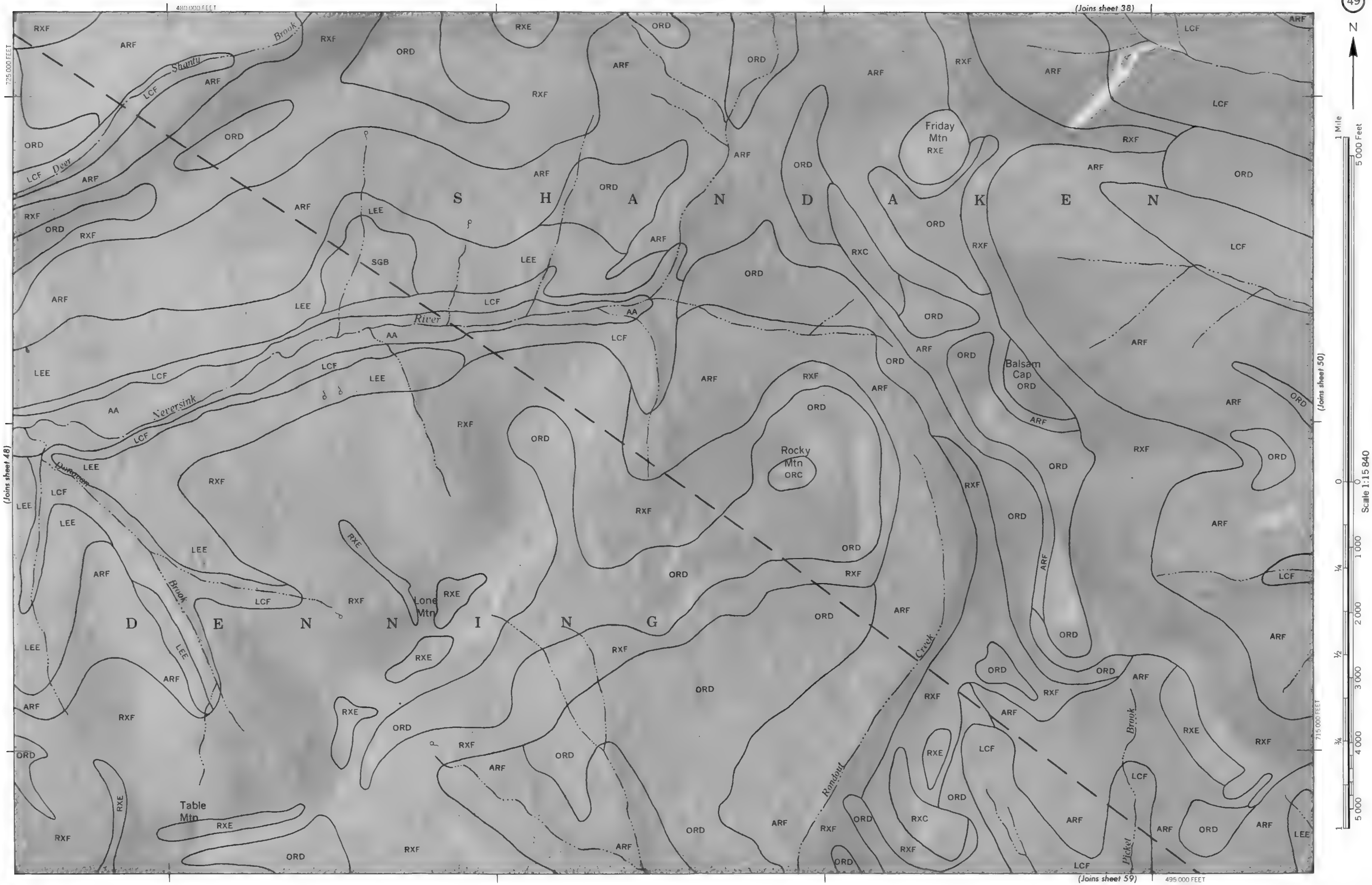

44
N
(Joins sheet 32)
(Joins sheet 43)
(Joins sheet 55)
615 000 FEET
600 000 FEET
230 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000
S A U G E R T I E S
U L S T E R
Flatbush
Turkey Point
Tyler Point
HUDSON RIVER
DUTCHESS COUNTY
Esopus Creek
Lake Katrine
CLAY PIT
9W
32

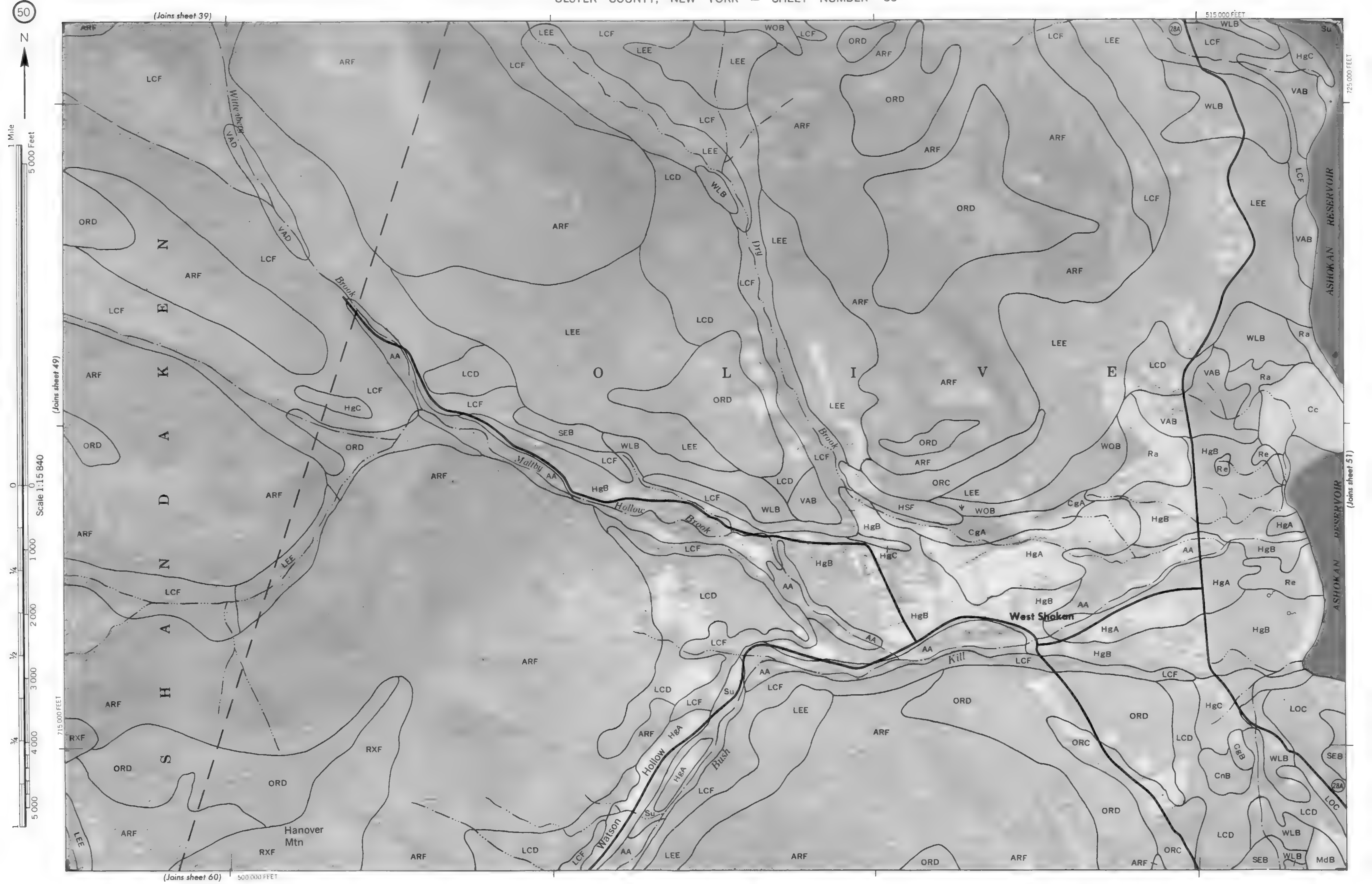

(Joins sheet 34)
(Joins sheet 46)
(Joins inset)
(Joins inset, sheet 56)
400 000 FEET
415 000 FEET
H A R D E N B U R G H
D E N N I N G
MONGAUP MOUNTAIN
Sucker Brook
SULLIVAN COUNTY
Sand Pond
water
ORD
ORC
ARF
RXF
RXE
RXC
LEE
SGB
WLB
WOB
VAB
VAD
LCF
At
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 33)
(Joins upper left)
393 000 FEET
398 000 FEET
726 000 FEET
723 000 FEET
LCF
LCD
SEB
AA
3000 AND 5000-FOOT GRID TICKS

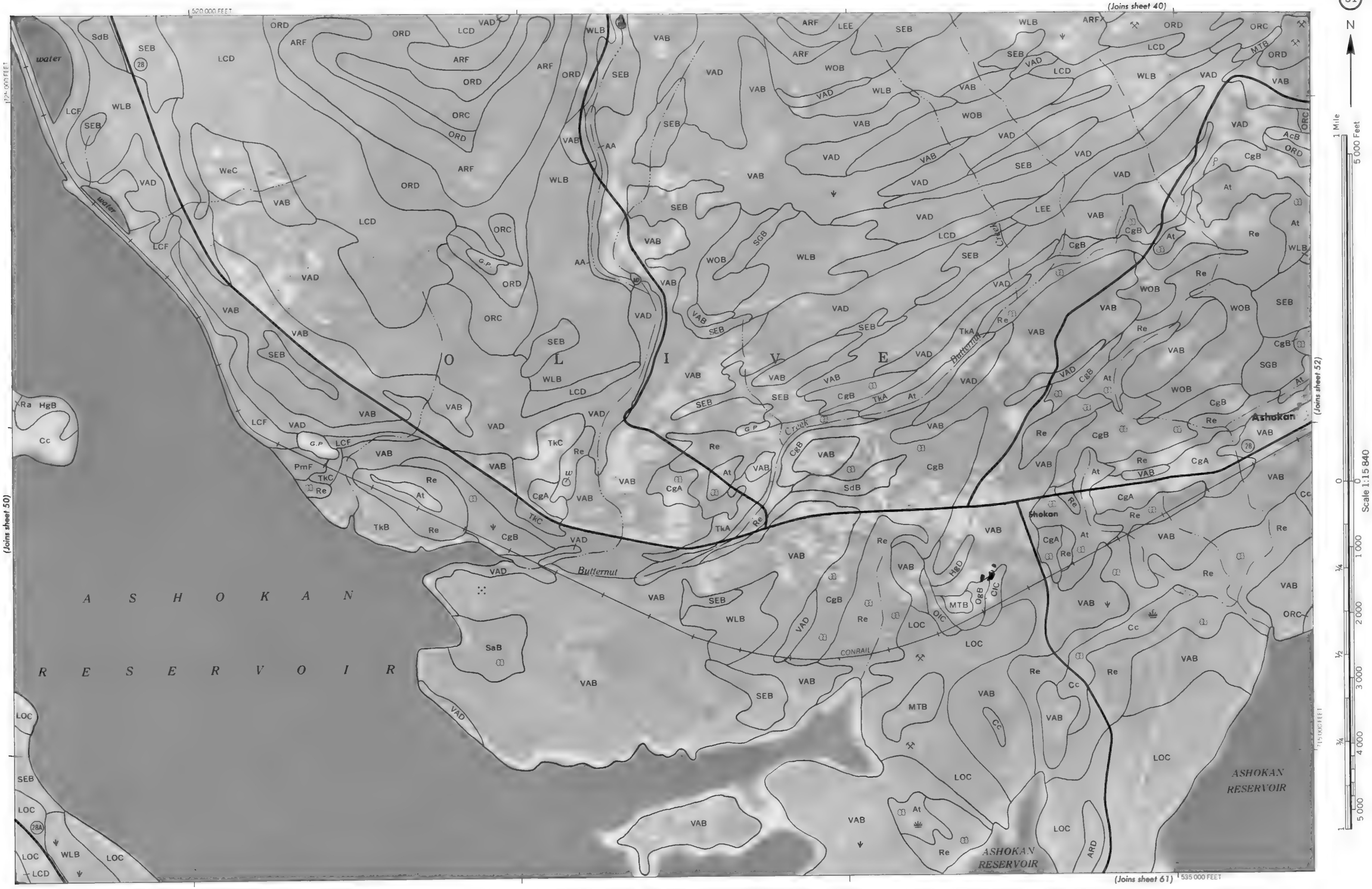

N
(Joins sheet 35)
HARDENBURGH
(Joins sheet 45)
(Joins sheet 47)
(Joins sheet 56)
D E N N I N G
Full Brook
435 000 FEET
725 000 FEET
715 000 FEET
420 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
RXF
RXE
RXC
ARF
ORD
ORC
LCD
LEE
LCF
WLB
WOB
SGB
SEB
MTB
AA
VAD
VAB
Su
At

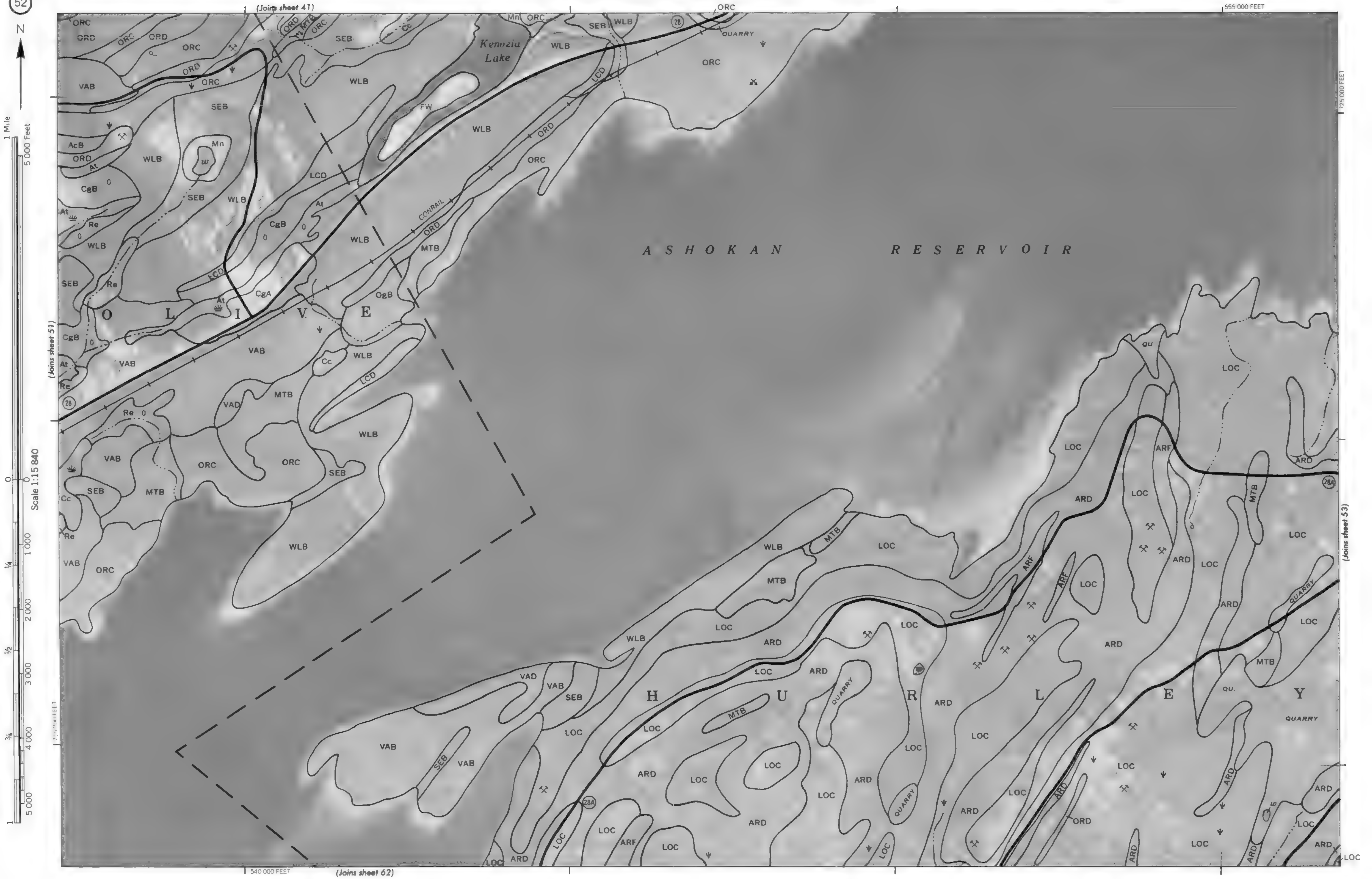

440 000 FEET
725 000 FEET
(Joins sheet 36)
(Joins sheet 46)
(Joins sheet 48)
(Joins sheet 57)
455 000 FEET
715 000 FEET
N
D E N N I N G
Frost Valley
water
Neversink River
West Branch
High Falls Brook
Flat Brook
Pigeon Creek
Biscuit Bk
Erts Bk
1 Mile
5 000 Feet
Scale 1:15 840

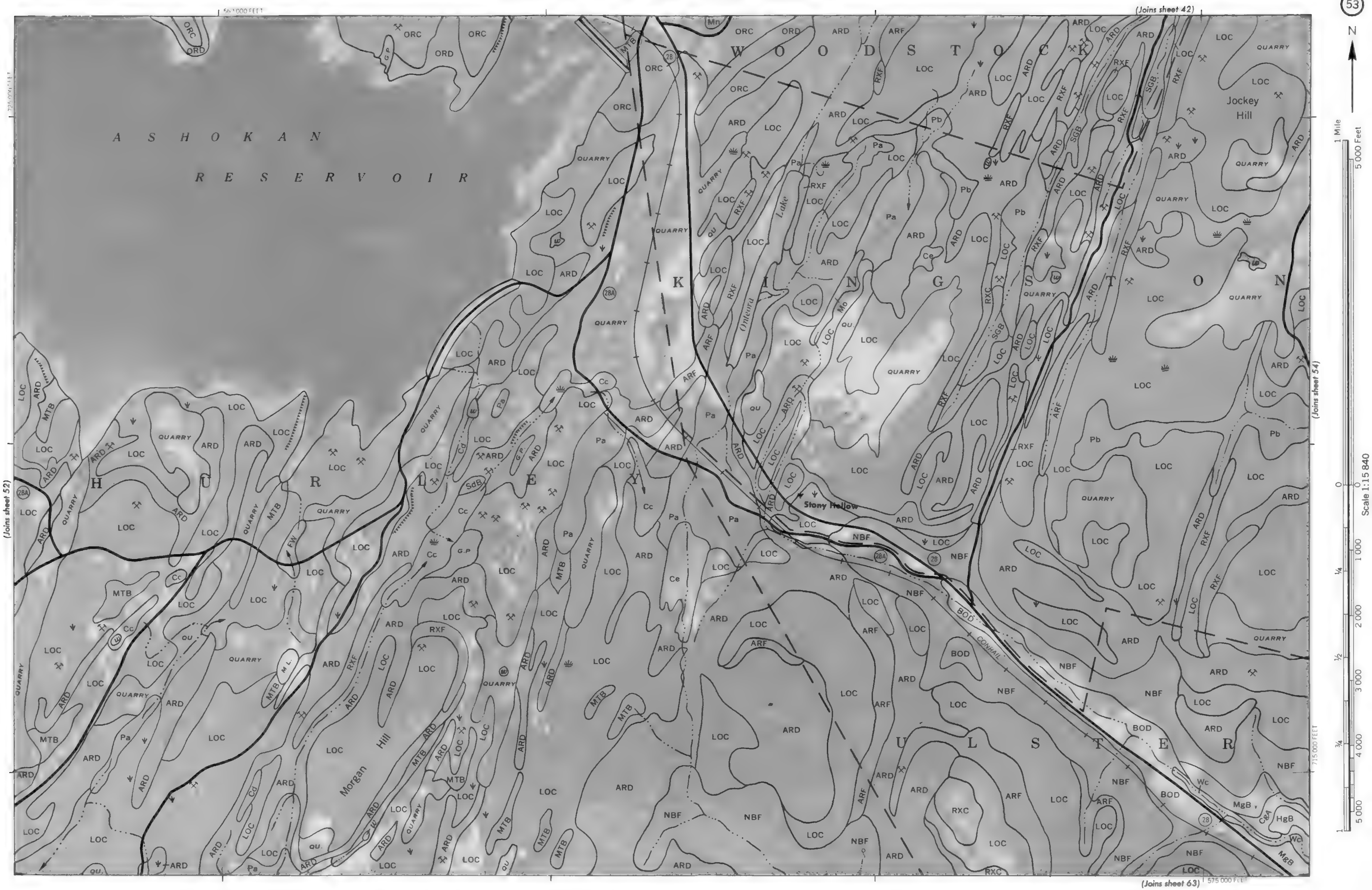

48
SHANDAKEN
(Joins sheet 37)
(Joins sheet 47)
(Joins sheet 49)
(Joins sheet 58)
475 000 FEET
460 000 FEET
715 000 FEET
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
¼
2 000
½
3 000
4 000
¾
5 000
1
Wildcat Mtn
West Branch
Neversink River
East Branch
Neversink
Flat Brook
Riley Brook
Deer Shanty Brook
Tray Mill Brook
D E N N I N G
ORD
WLB
WOB
LEE
LCF
LCD
AA
ARF
RXF
RXE
RXC
ORC
SGB
VAD
MO
HgB
HgC
HgD
HgA
HfA
Be

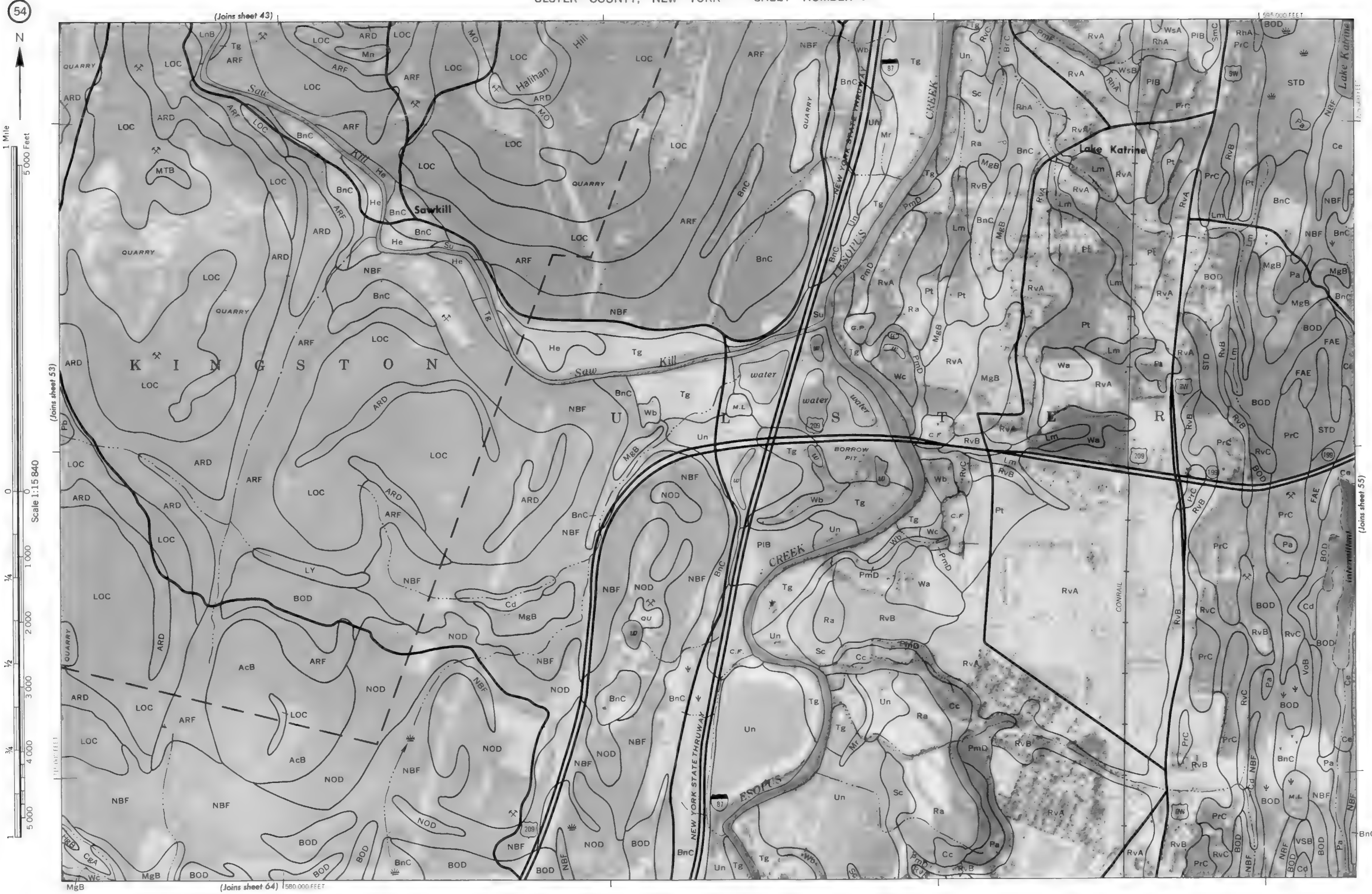

49
N
(Joins sheet 38)
(Joins sheet 48)
(Joins sheet 50)
(Joins sheet 59)
480 000 FEET
495 000 FEET
725 000 FEET
715 000 FEET
S H A N D A K E N
D E N N I N G
Friday Mtn
Balsam Cap
Rocky Mtn
Lone Mtn
Table Mtn
Shanty Brook
Deer
Neversink River
Dunwoon
Brook
Rondout Creek
Pickel Brook
1 Mile
5 000 Feet
Scale 1:15 840


50
N
(Joins sheet 39)
(Joins sheet 49)
(Joins sheet 51)
(Joins sheet 60)
515 000 FEET
725 000 FEET
715 000 FEET
500 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
S H A N D A K E N
O L I V E
West Shokan
Hanover Mtn
ASHOKAN RESERVOIR
Witteberg
Brook
Maltby Hollow Brook
Dry Brook
Kill
Watson Hollow
Bush
28A

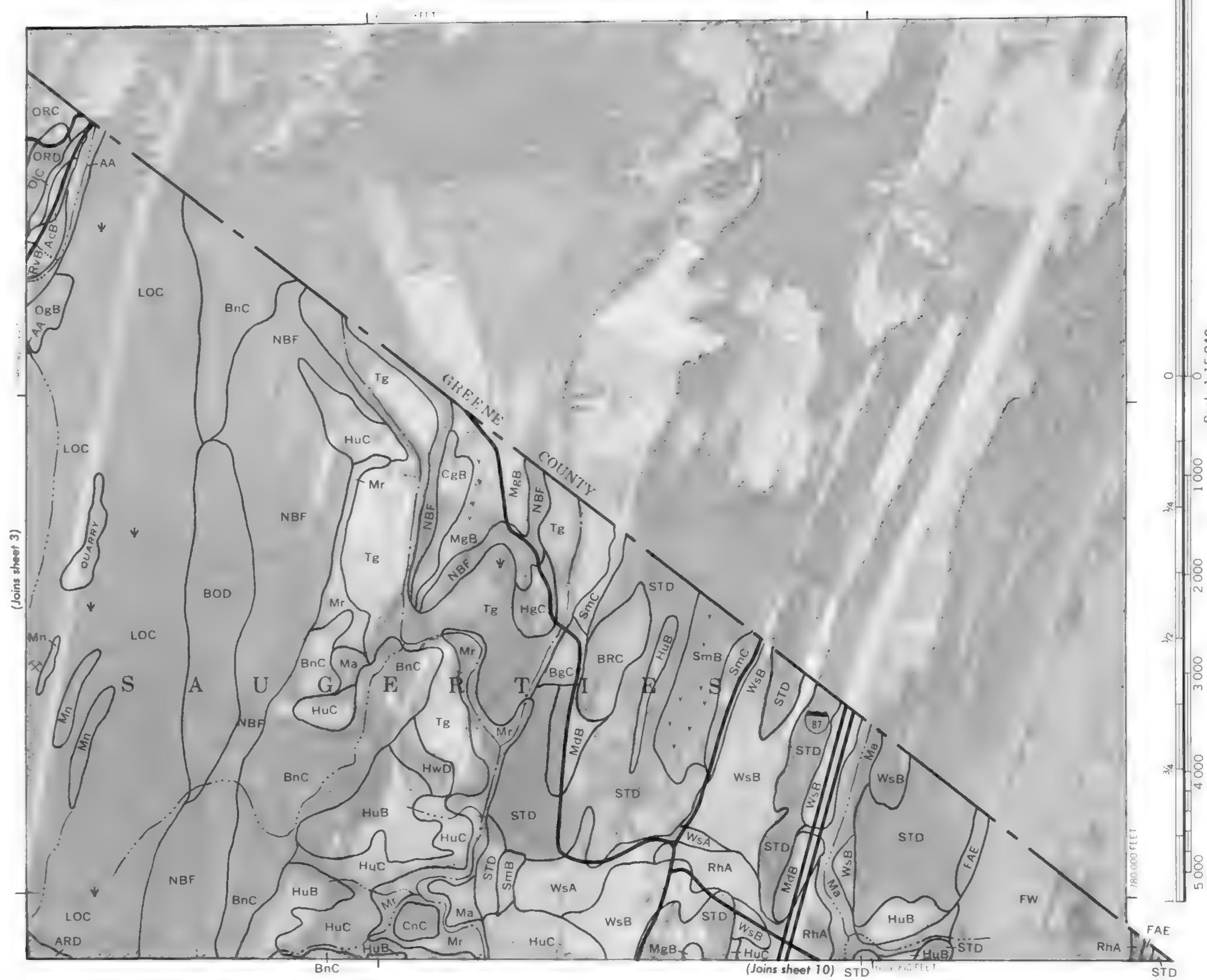

(Joins sheet 40)
(Joins sheet 50)
(Joins sheet 52)
(Joins sheet 61)
520 000 FEET
535 000 FEET
N
O L I V E
A S H O K A N
R E S E R V O I R
ASHOKAN RESERVOIR
Ashokan
Shokan
Butternut
Butternut Creek
Creek
CONRAIL
water
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000

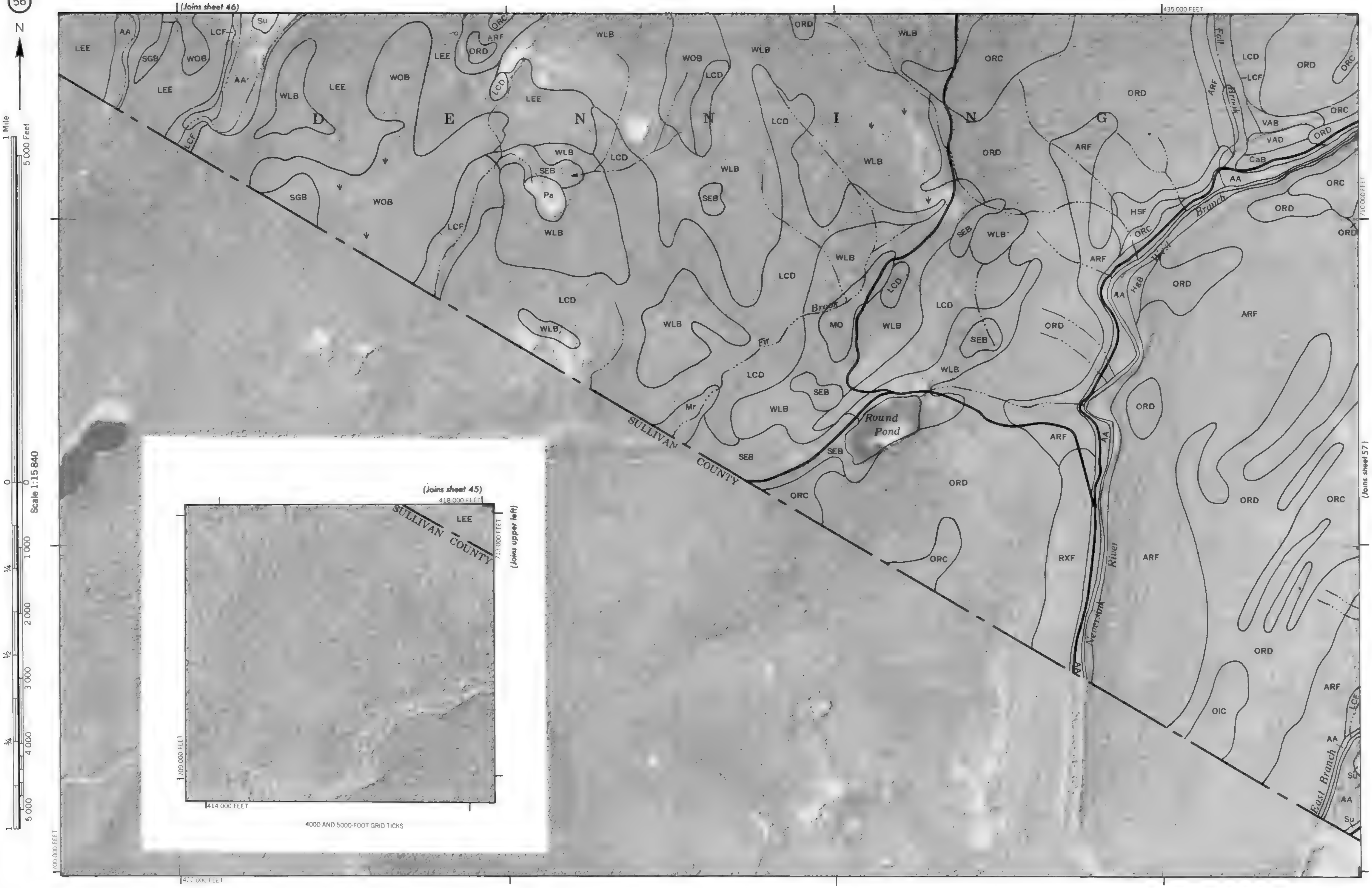

(Joins sheet 41)
(Joins sheet 51)
(Joins sheet 53)
(Joins sheet 62)
555 000 FEET
540 000 FEET
725 000 FEET
Kenozia Lake
A S H O K A N R E S E R V O I R
O L I V E
H U R L E Y
CONRAIL
QUARRY
N
1 Mile
5 000 Feet
Scale 1:15 840

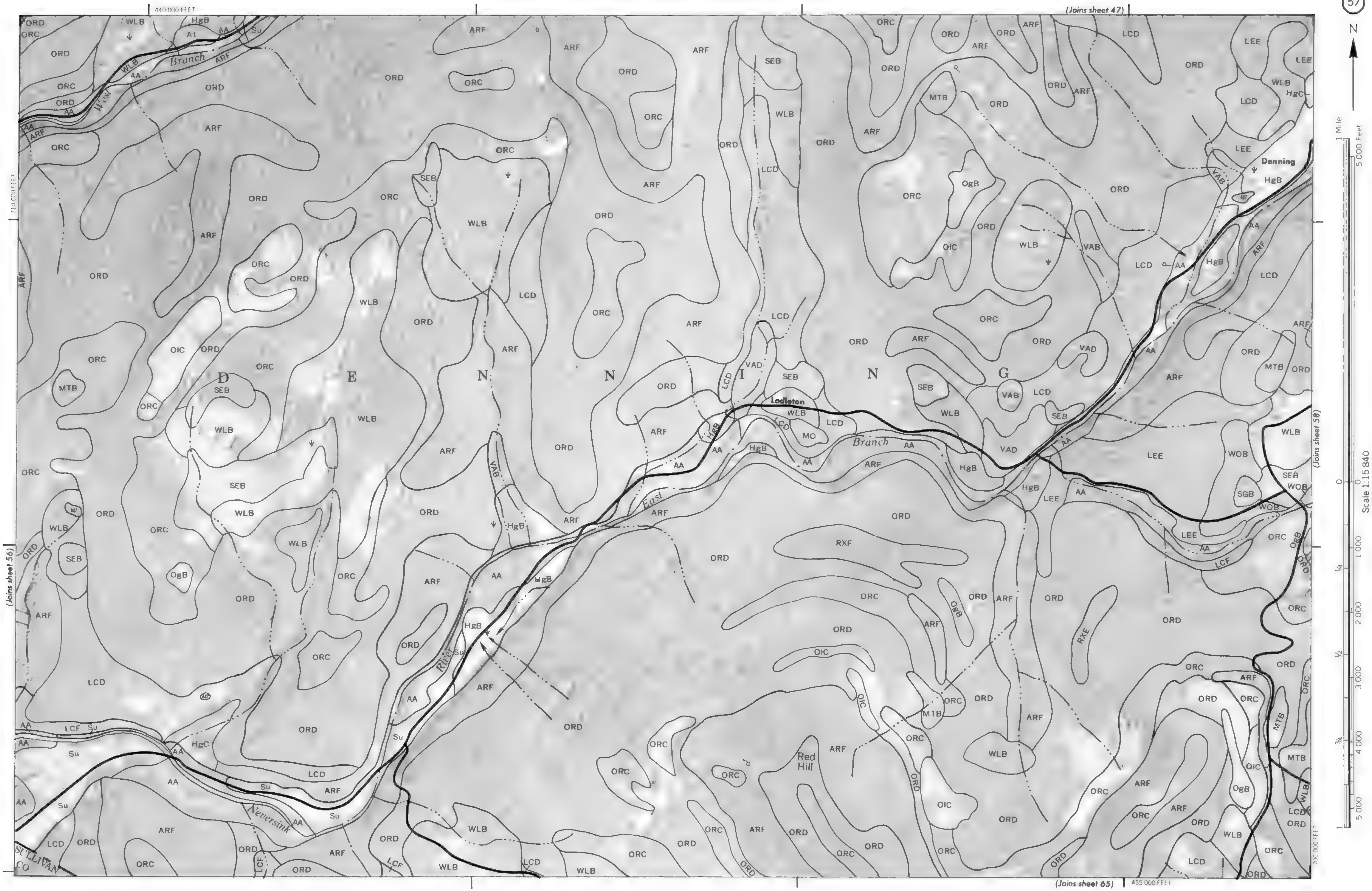

53
N
(Joins sheet 42)
A S H O K A N
R E S E R V O I R
W O O D S T O C K
K I N G S T O N
H U R L E Y
U L S T E R
Jockey Hill
Onteora Lake
Stony Hollow
Morgan Hill
(Joins sheet 52)
(Joins sheet 54)
(Joins sheet 63)
Scale 1:15 840
1 Mile
5 000 Feet

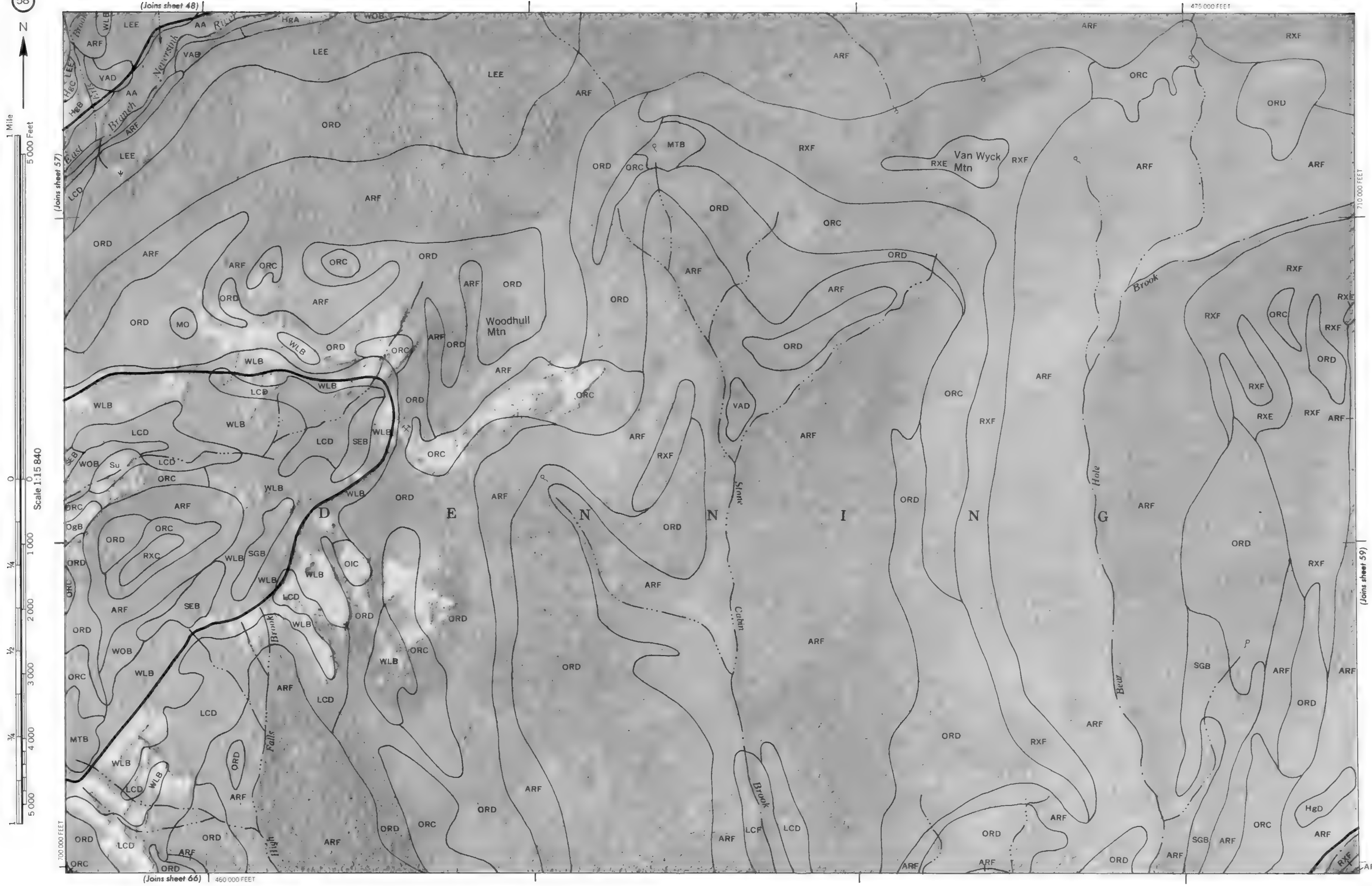

54
N
(Joins sheet 43)
(Joins sheet 53)
(Joins sheet 55)
(Joins sheet 64)
KINGSTON
ULSTER
Sawkill
Saw Kill
Halihan Hill
Lake Katrine
ESOPUS CREEK
NEW YORK STATE THRUWAY
CONRAIL
QUARRY
BORROW PIT
water
595 000 FEET
580 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840

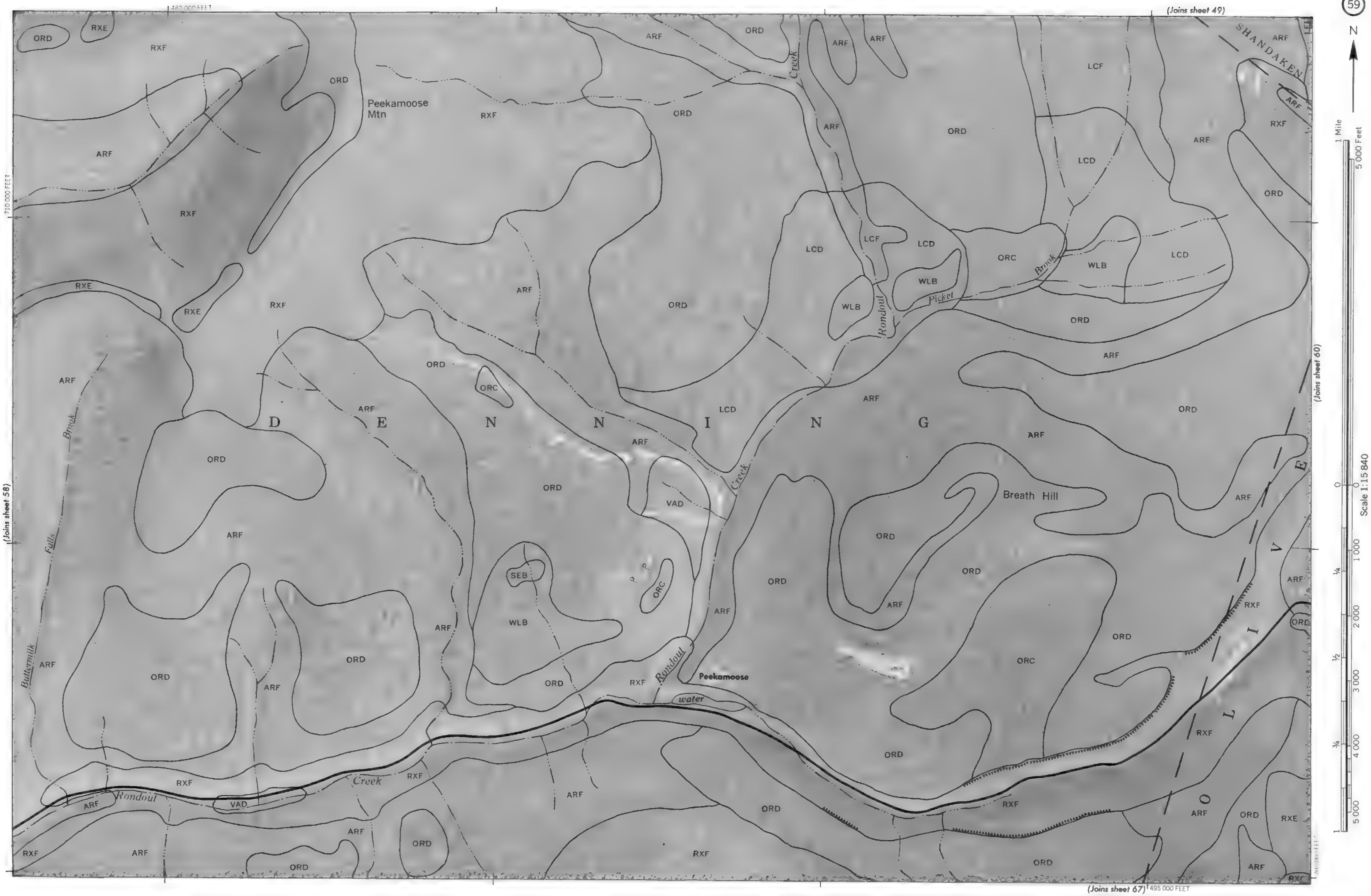

598 000 FEET
(Joins sheet 44)
Lake Katrine
KINGSTON-RHINECLIFF BRIDGE
U L S T E R
H U D S O N R I V E R
DUTCHESS COUNTY
(Joins sheet 54)
(Joins inset, sheet 73)
603 000 FEET
15 000 FEET

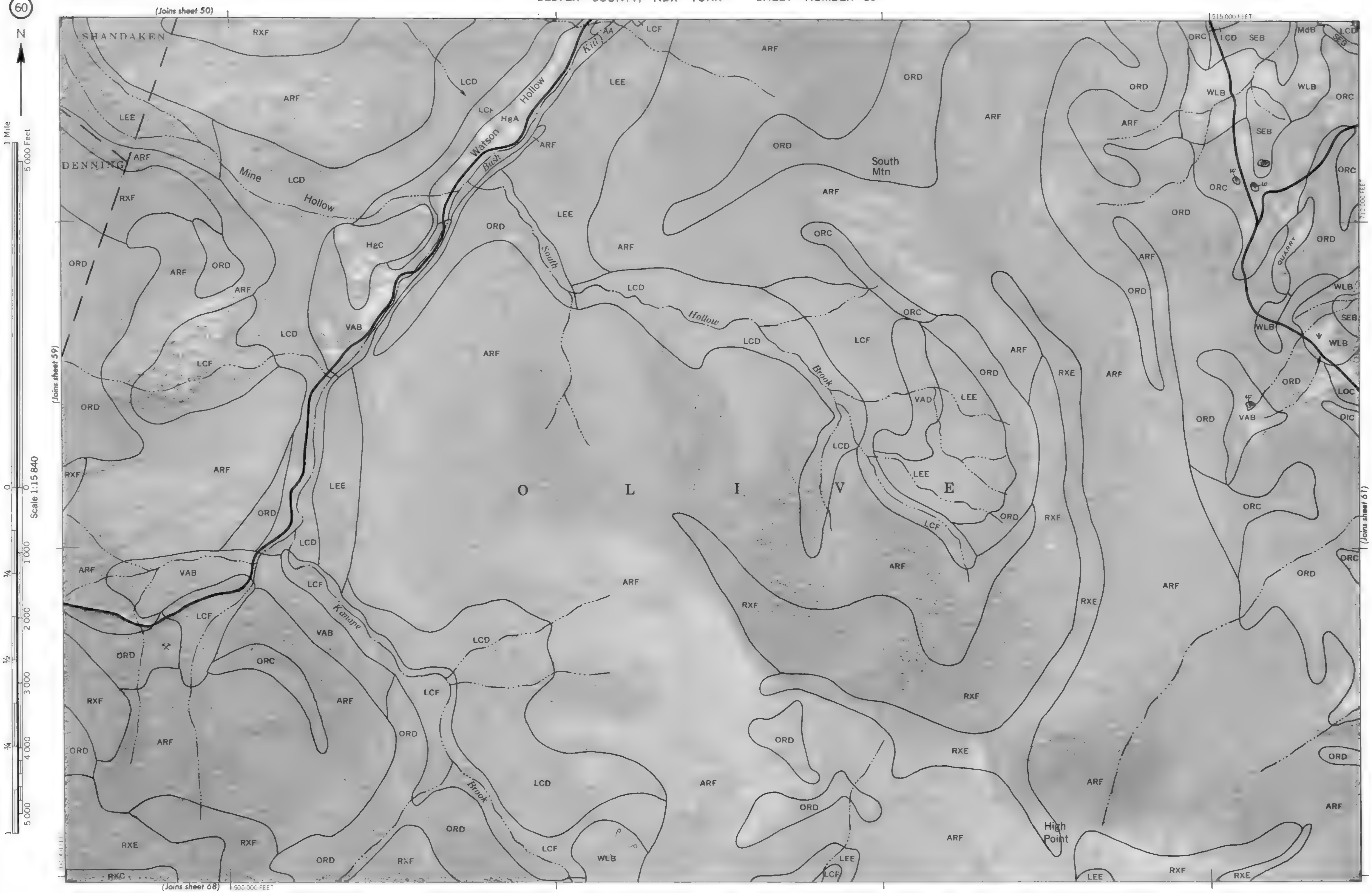

GREENE COUNTY
S A U G E R T I E S
(Joins sheet 3)
(Joins sheet 10)
N
1 Mile
5 000 Feet
Scale 1:15 840

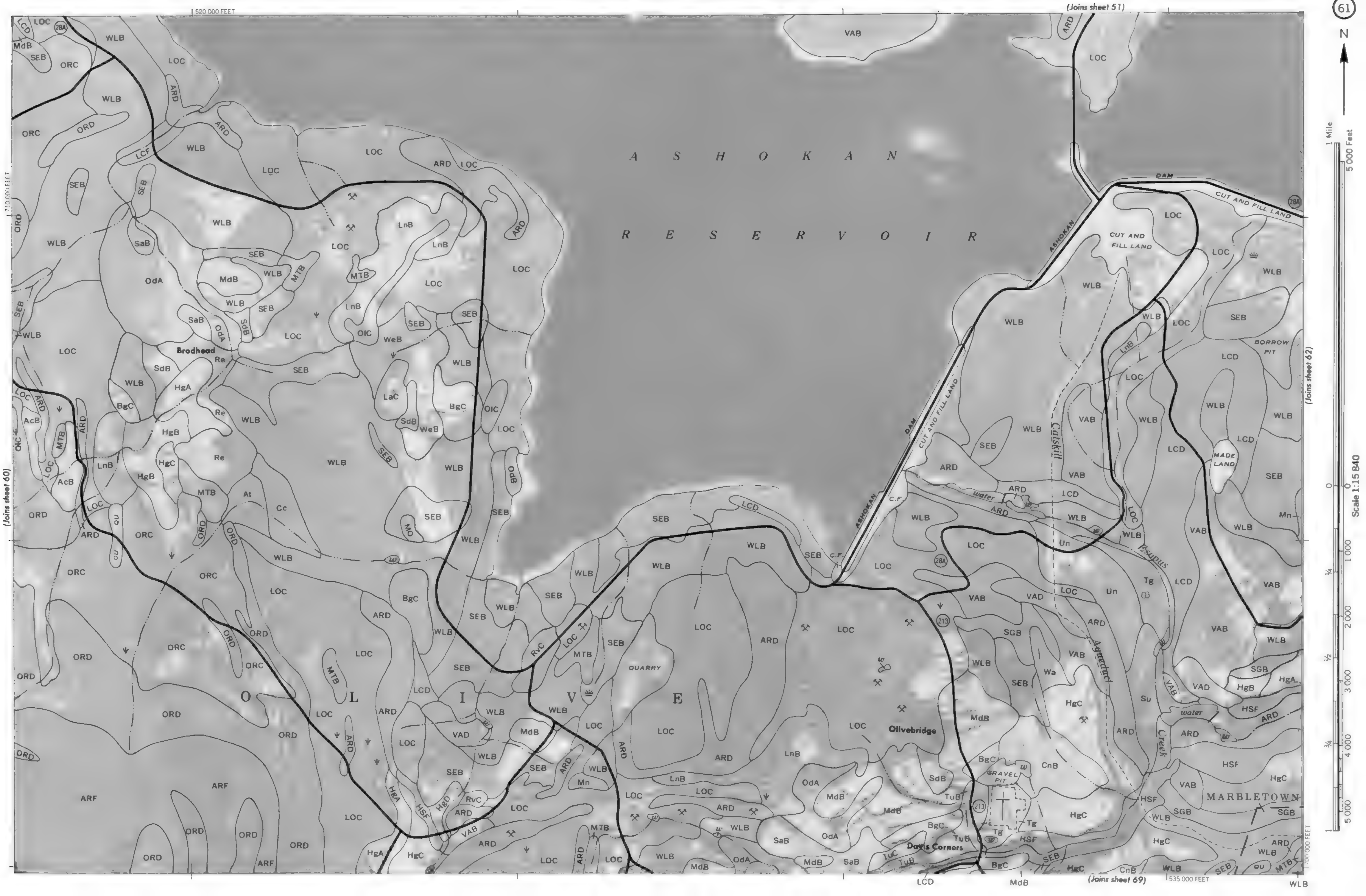

N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 46)
(Joins sheet 57)
435 000 FEET
710 000 FEET
700 000 FEET
420 000 FEET
D E N N I N G
SULLIVAN COUNTY
Round Pond
Neversink River
West Branch
East Branch
Fall Brook
Fir Brook
LEE
AA
LCF
Su
SGB
WOB
WLB
ORC
ARF
ORD
LCD
SEB
Pa
MO
Mr
HSF
HgB
VAB
VAD
CaB
RXF
OIC
(Joins sheet 45)
418 000 FEET
713 000 FEET
(Joins upper left)
709 000 FEET
414 000 FEET
4000 AND 5000-FOOT GRID TICKS

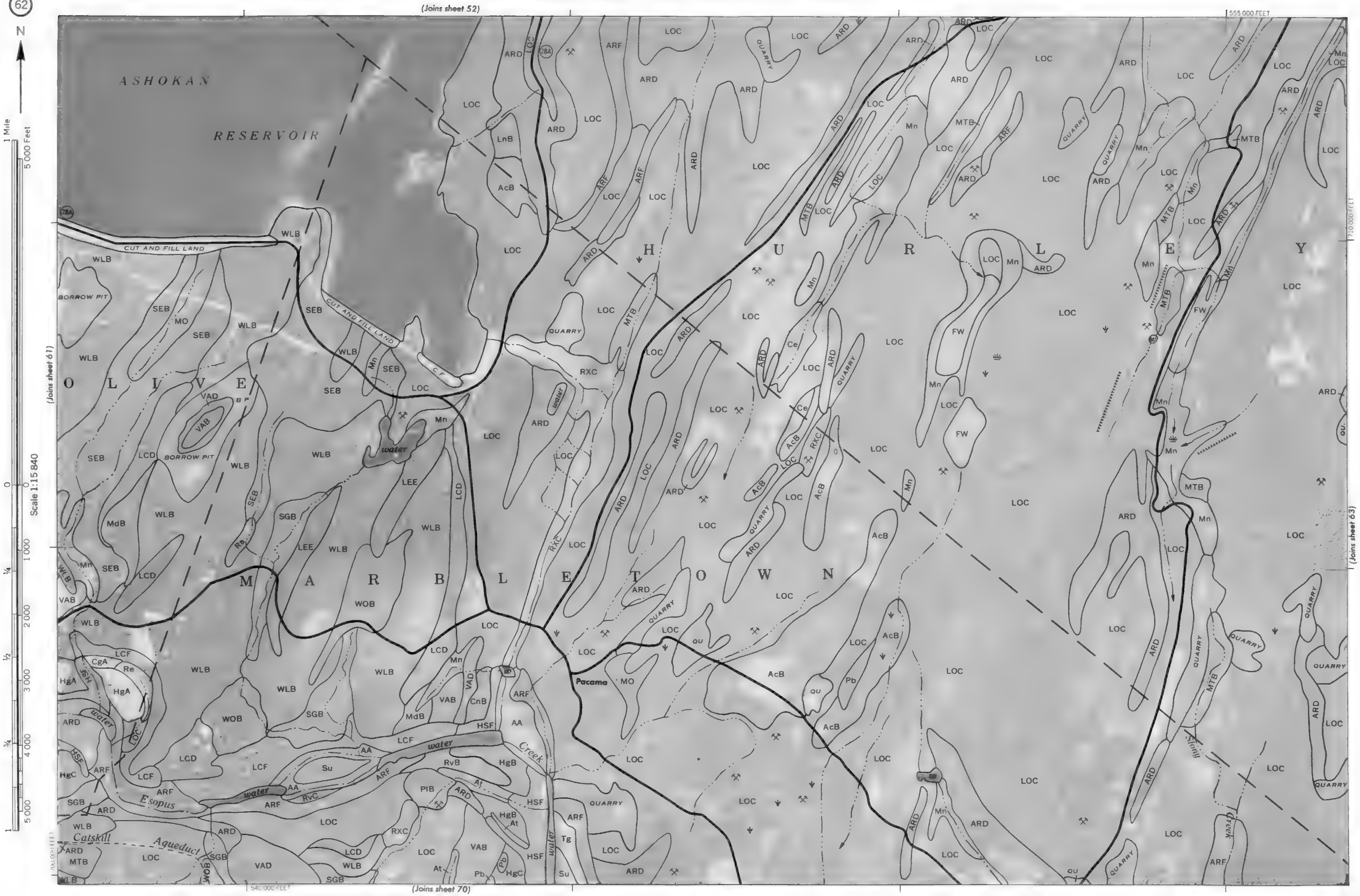

(Joins sheet 47)
(Joins sheet 56)
(Joins sheet 58)
(Joins sheet 65)
440 000 FEET
455 000 FEET
210 000 FEET
200 000 FEET
N
Scale 1:15 840
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000
D
E
N
N
I
N
G
Denning
Ladleton
Red Hill
West Branch
East Branch
River
Neversink
SULLIVAN CO

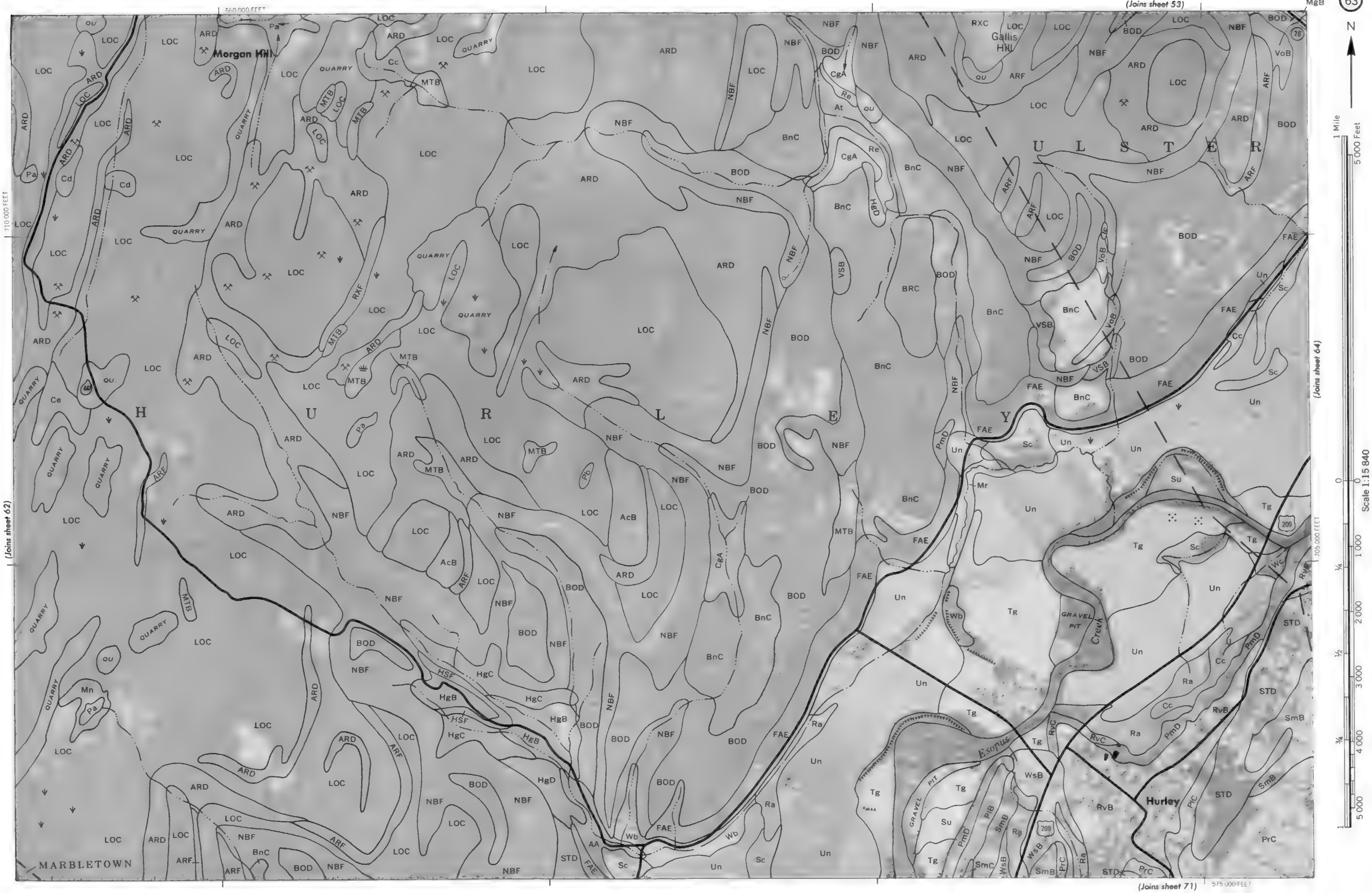

N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 48)
(Joins sheet 57)
(Joins sheet 59)
(Joins sheet 66)
475 000 FEET
710 000 FEET
700 000 FEET
460 000 FEET
East Branch Neversink River
Van Wyck Mtn
Woodhull Mtn
D E N N I N G
Stone Cabin Brook
Hole Brook
Bear Brook
High Falls Brook
ARF
ORD
ORC
RXF
RXE
LEE
WLB
LCD
SEB
SGB
WOB
VAD
VAB
MTB
MO
OIC
RXC
OgB
HgA
HgB
HgC
HgD
AA
Su
LCF


(Joins sheet 49)
(Joins sheet 58)
(Joins sheet 60)
(Joins sheet 67)
480 000 FEET
710 000 FEET
495 000 FEET
Peekamoose Mtn
Peekamoose
Breath Hill
D E N N I N G
O L I V E
SHANDAKEN
Rondout Creek
Buttermilk Falls Brook
Picket Brook
water
ORD
RXE
RXF
ARF
LCF
LCD
ORC
WLB
VAD
SEB
N
1 Mile
5 000 Feet
Scale 1:15 840

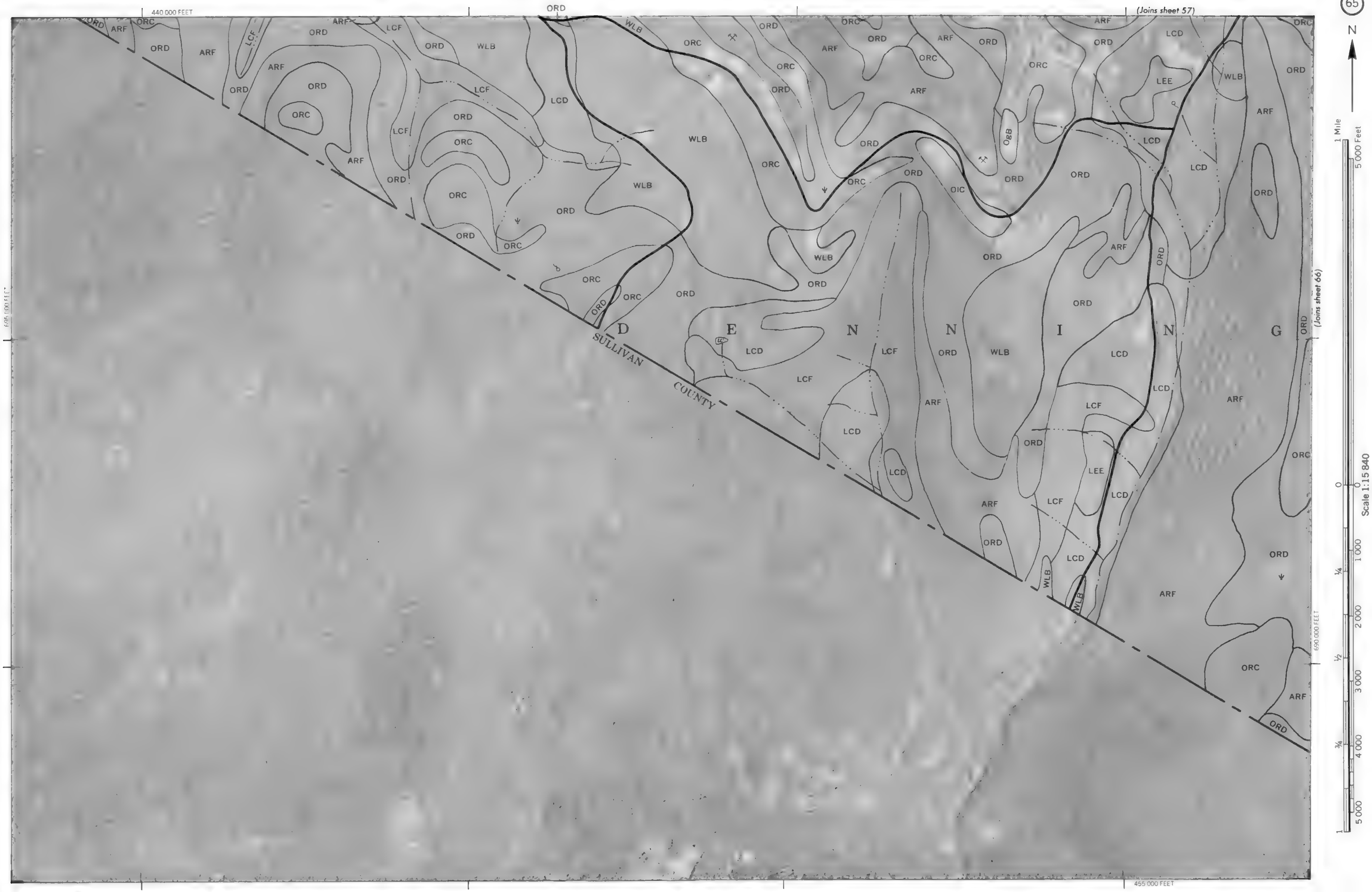

60
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 50)
(Joins sheet 59)
(Joins sheet 61)
(Joins sheet 68)
515 000 FEET
500 000 FEET
SHANDAKEN
DENNING
O L I V E
Mine Hollow
Watson Hollow
Bush Kill
South Hollow Brook
Kanape Brook
South Mtn
High Point
QUARRY
ARF
ARF
RXF
LCD
LCF
LEE
ORD
ORC
VAB
VAD
HgA
HgC
AA
RXE
RXC
WLB
SEB
MdB
LOC
OIC

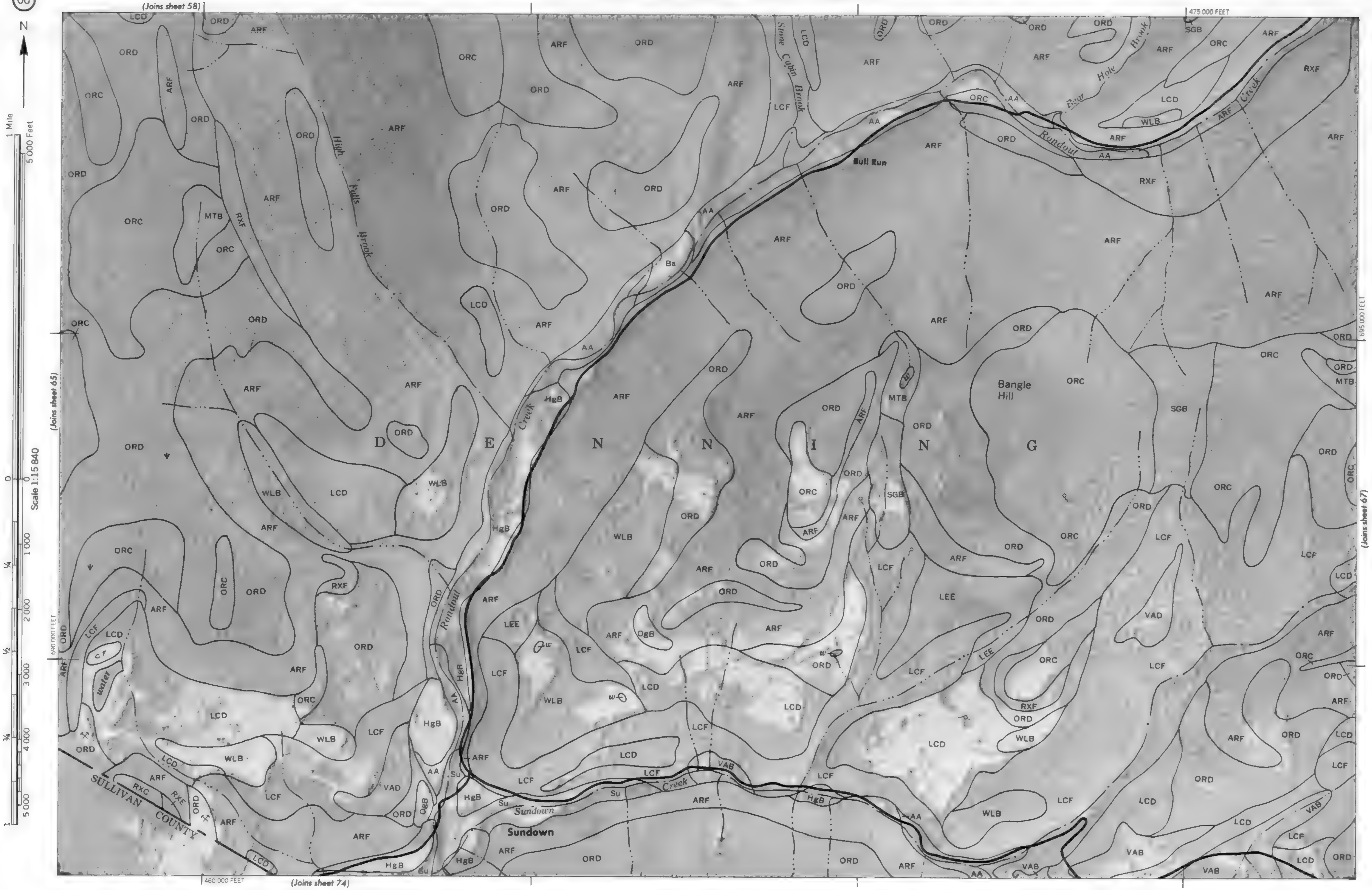

61
N
(Joins sheet 51)
(Joins sheet 60)
(Joins sheet 62)
(Joins sheet 69)
520 000 FEET
535 000 FEET
A S H O K A N
R E S E R V O I R
DAM
CUT AND FILL LAND
ASHOKAN
Brodhead
Olivebridge
Davis Corners
O L I V E
MARBLETOWN
QUARRY
BORROW PIT
MADE LAND
GRAVEL PIT
Catskill
Esopus
Aqueduct
Creek
water
1 Mile
5 000 Feet
Scale 1:15 840

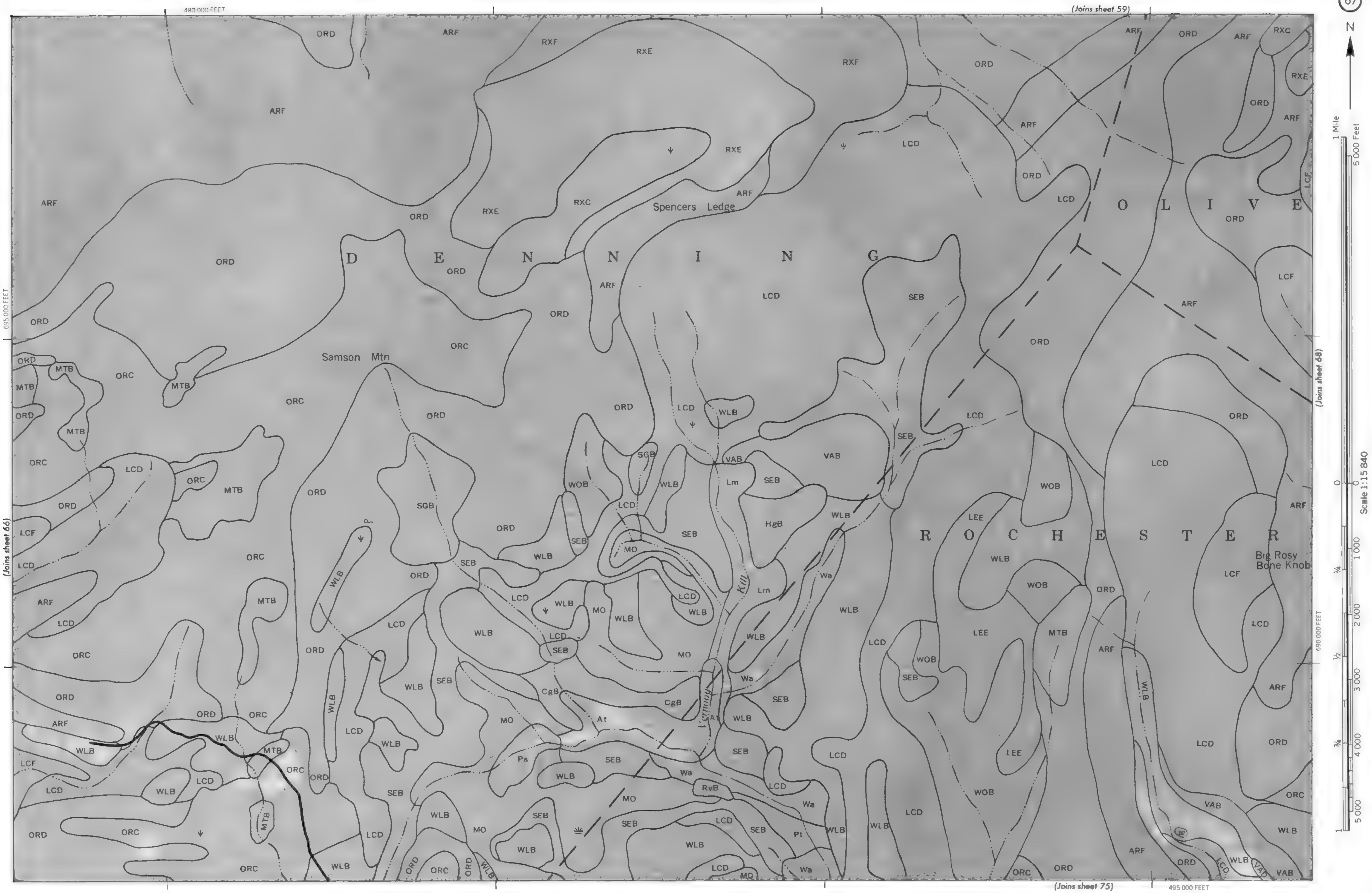

(Joins sheet 52)
(Joins sheet 61)
(Joins sheet 63)
(Joins sheet 70)
N
1 Mile
5 000 Feet
Scale 1:15 840
555 000 FEET
710 000 FEET
540 000 FEET
ASHOKAN
RESERVOIR
OLIVE
MARBLETOWN
HURLEY
CUT AND FILL LAND
BORROW PIT
Pacama
Esopus
Creek
Catskill
Aqueduct
Stony
QUARRY
water

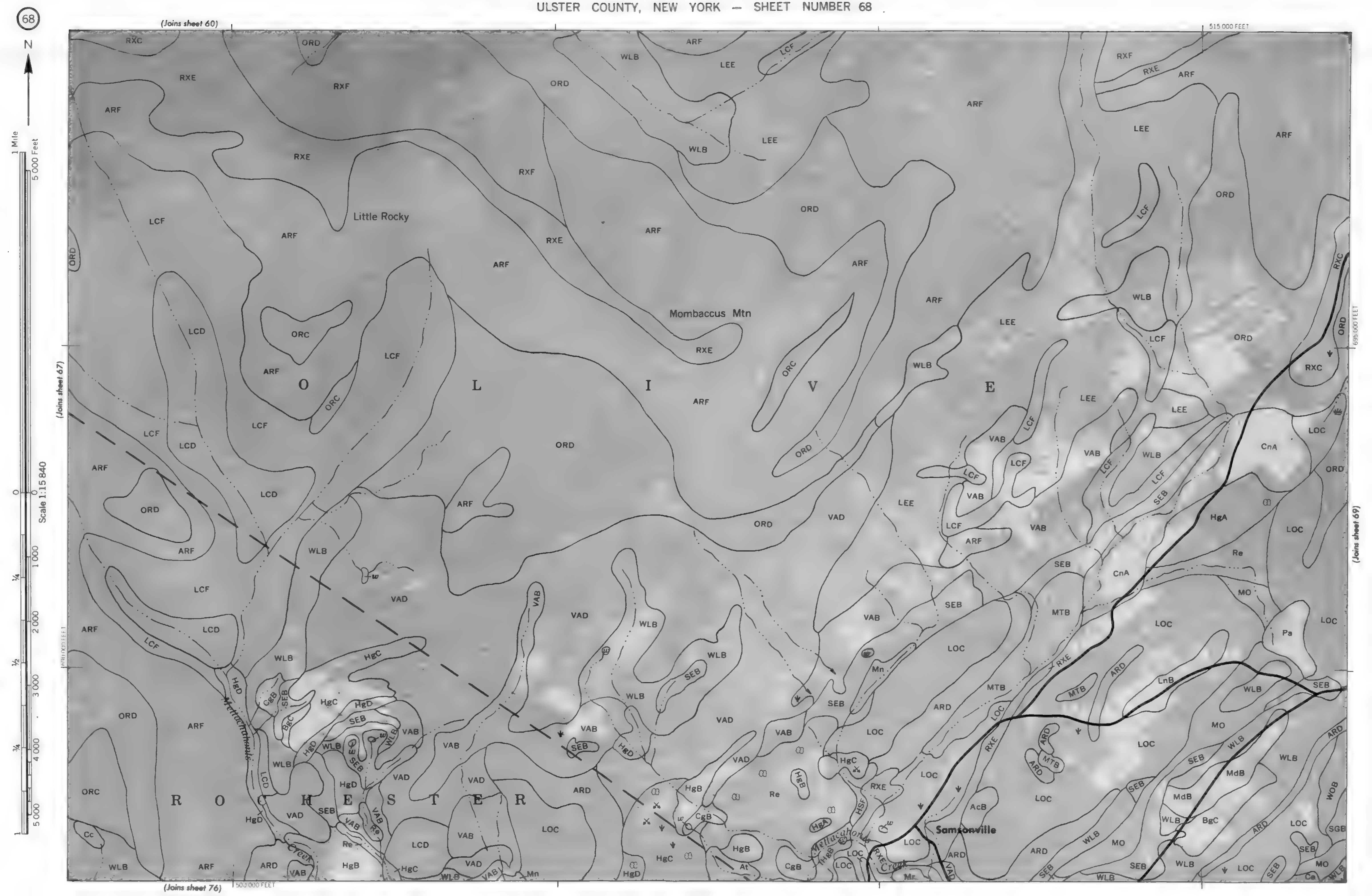

(Joins sheet 53)
(Joins sheet 62)
(Joins sheet 64)
(Joins sheet 71)
Morgan Hill
Gallis Hill
U L S T E R
H U R L E Y
MARBLETOWN
Hurley
Esopus Creek
GRAVEL PIT
QUARRY
N
1 Mile
5 000 Feet
Scale 1:15 840
560 000 FEET
710 000 FEET
705 000 FEET
575 000 FEET

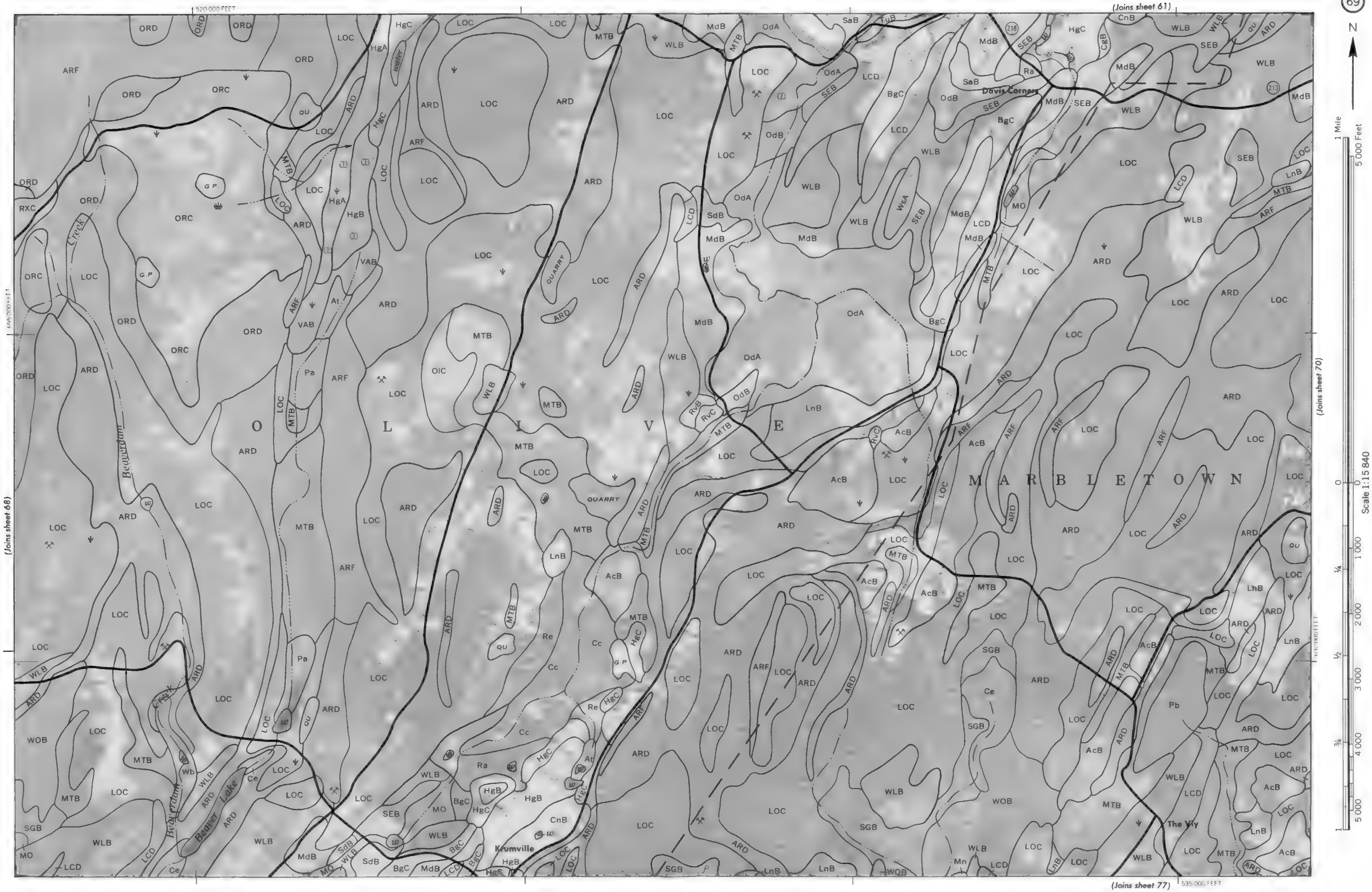

(Joins sheet 54)
(Joins sheet 63)
(Joins sheet 72)
(Joins inset, sheet 73)
N
1 Mile
5 000 Feet
Scale 1:15 840
580 000 FEET
595 000 FEET
U L S T E R
K I N G S T O N
HURLEY
KINGSTON
(county seat)
Lincoln Park
ESOPUS
CREEK
BORROW PIT
QUARRY
GRAVEL PIT
MADE LAND
CUT AND FILL LAND
CONRAIL
water

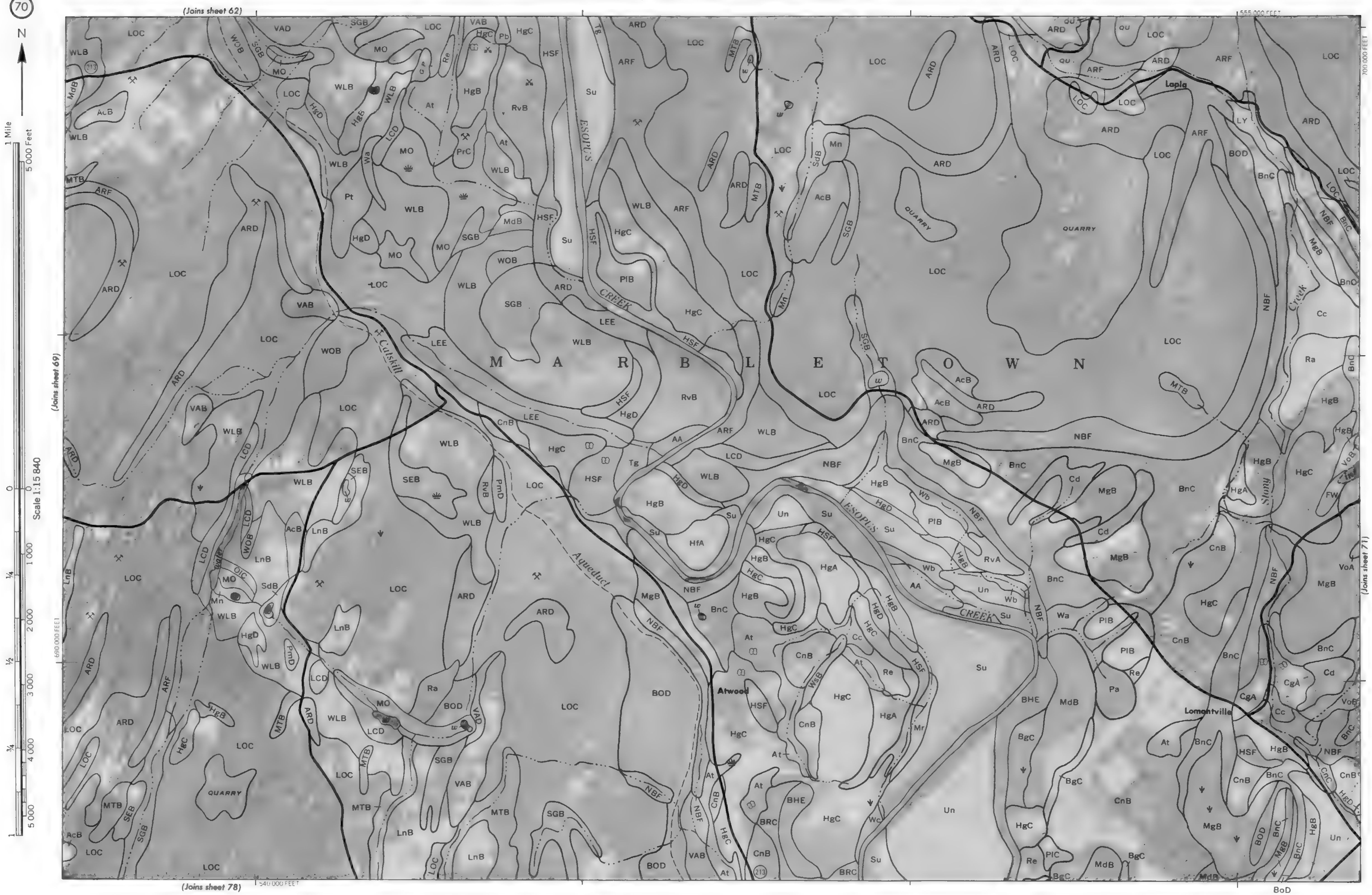

440 000 FEET
(Joins sheet 57)
(Joins sheet 66)
N
695 000 FEET
690 000 FEET
455 000 FEET
D E N N I N G
SULLIVAN COUNTY
ORD
ORC
ARF
LCF
LCD
WLB
LEE
OIC
OgB
Scale 1:15 840
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000


N
(Joins sheet 58)
(Joins sheet 65)
(Joins sheet 67)
(Joins sheet 74)
475 000 FEET
695 000 FEET
690 000 FEET
460 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
DENNING
Bangle Hill
Bull Run
Sundown
SULLIVAN COUNTY
Rondout Creek
Sundown Creek
High Falls Brook
Stone Cabin Brook
Bear Hole Brook
water

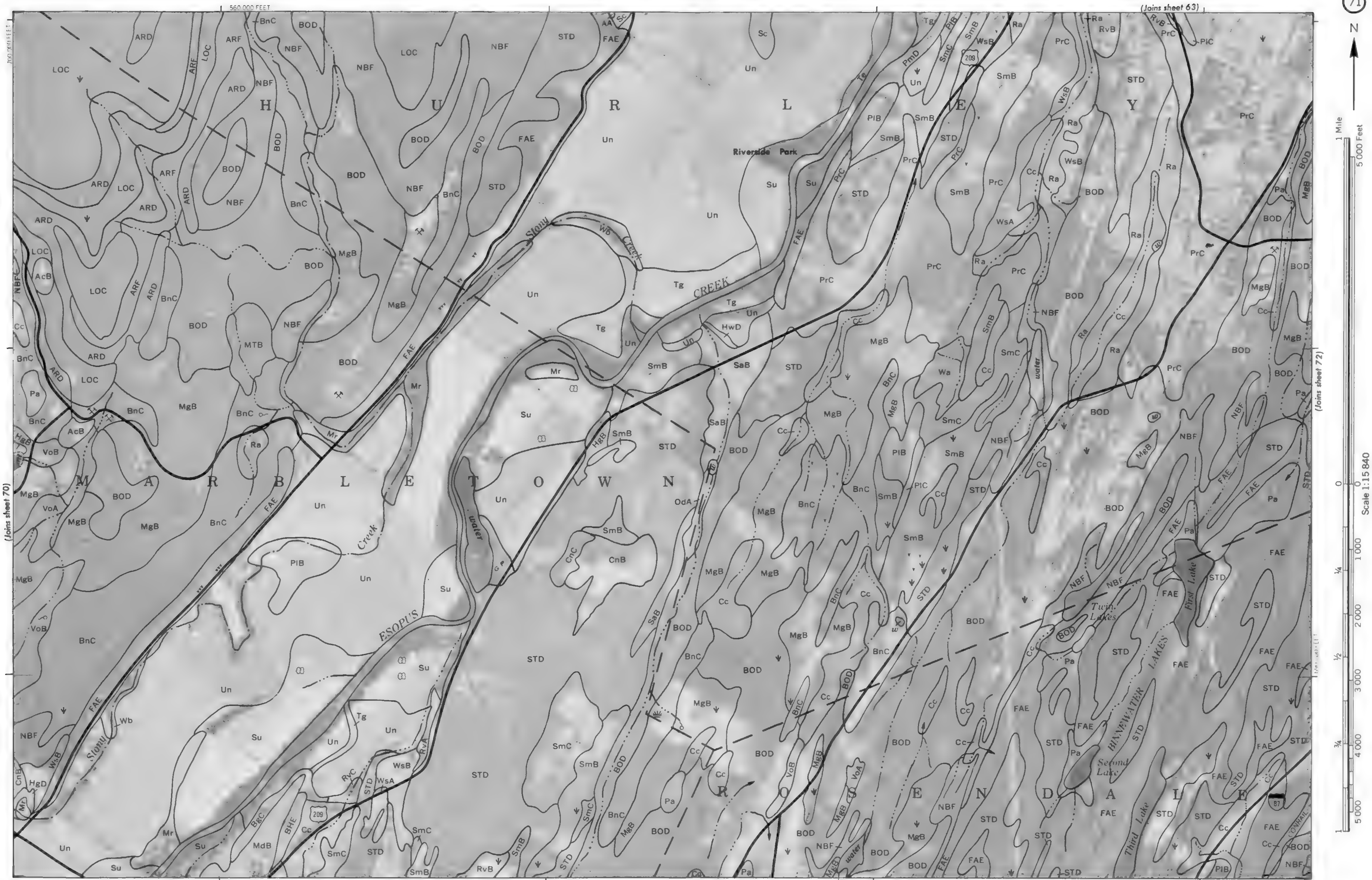

480 000 FEET
(Joins sheet 59)
(Joins sheet 66)
(Joins sheet 68)
(Joins sheet 75)
695 000 FEET
690 000 FEET
495 000 FEET
D E N N I N G
O L I V E
R O C H E S T E R
Spencers Ledge
Samson Mtn
Big Rosy Bone Knob
Vernooy Kill
N
1 Mile
5 000 Feet
Scale 1:15 840

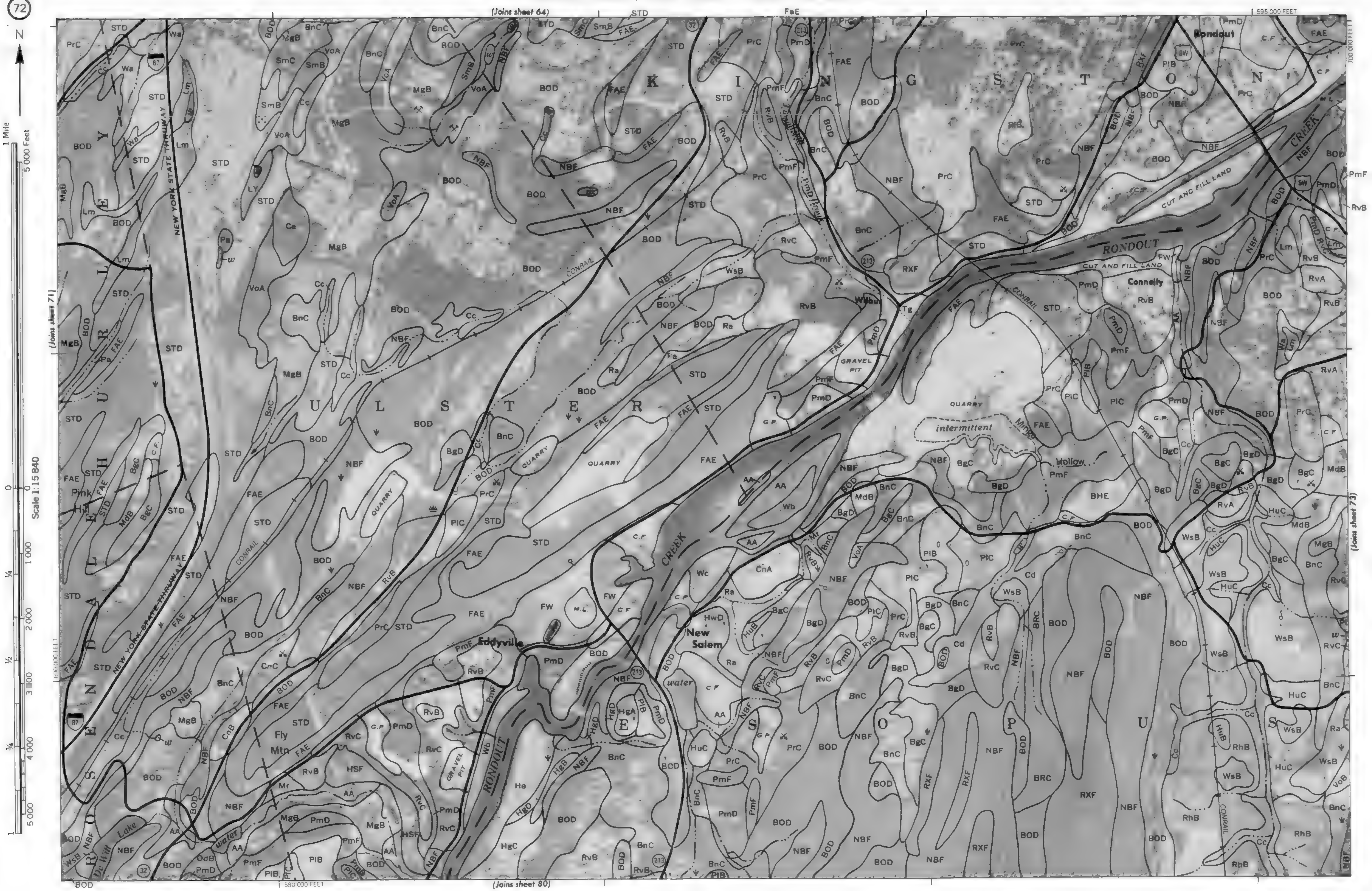

68
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 60)
(Joins sheet 67)
(Joins sheet 69)
(Joins sheet 76)
515 000 FEET
695 000 FEET
500 000 FEET
Little Rocky
Mombaccus Mtn
O L I V E
R O C H E S T E R
Samsonville
Mettacahonts Creek


(Joins sheet 61)
(Joins sheet 70)
(Joins sheet 77)
(Joins sheet 68)
520 000 FEET
535 000 FEET
O L I V E
M A R B L E T O W N
Davis Corners
Krumville
The Vly
Beaver Lake
Beaverdam Creek
QUARRY
N
Scale 1:15 840
1 Mile
5 000 Feet

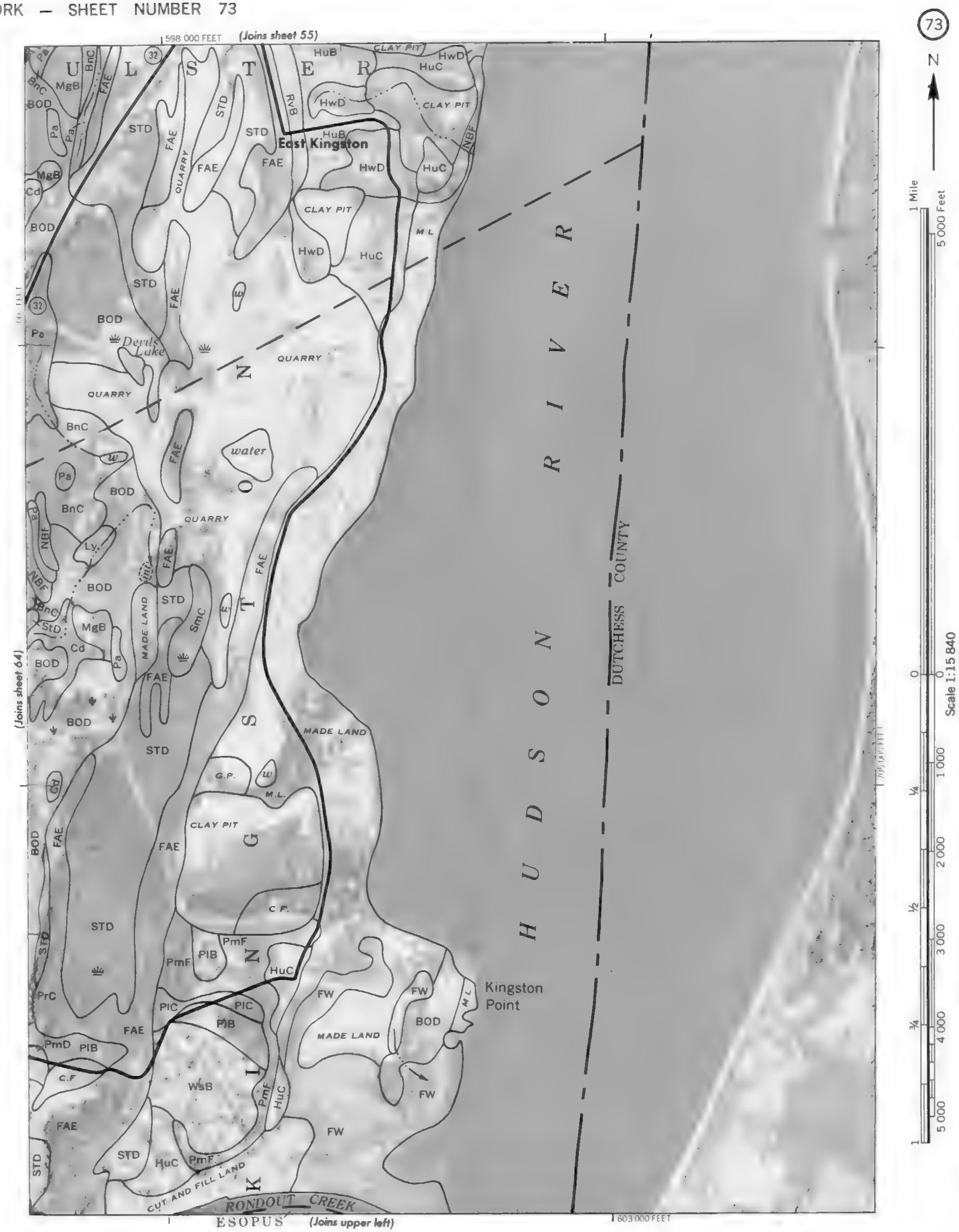

70
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 62)
(Joins sheet 69)
(Joins sheet 71)
(Joins sheet 78)
555 000 FEET
700 000 FEET
690 000 FEET
540 000 FEET
M A R B L E T O W N
ESOPUS CREEK
Catskill Aqueduct
Stony Creek
Lapla
Atwood
Lomontville
QUARRY
213

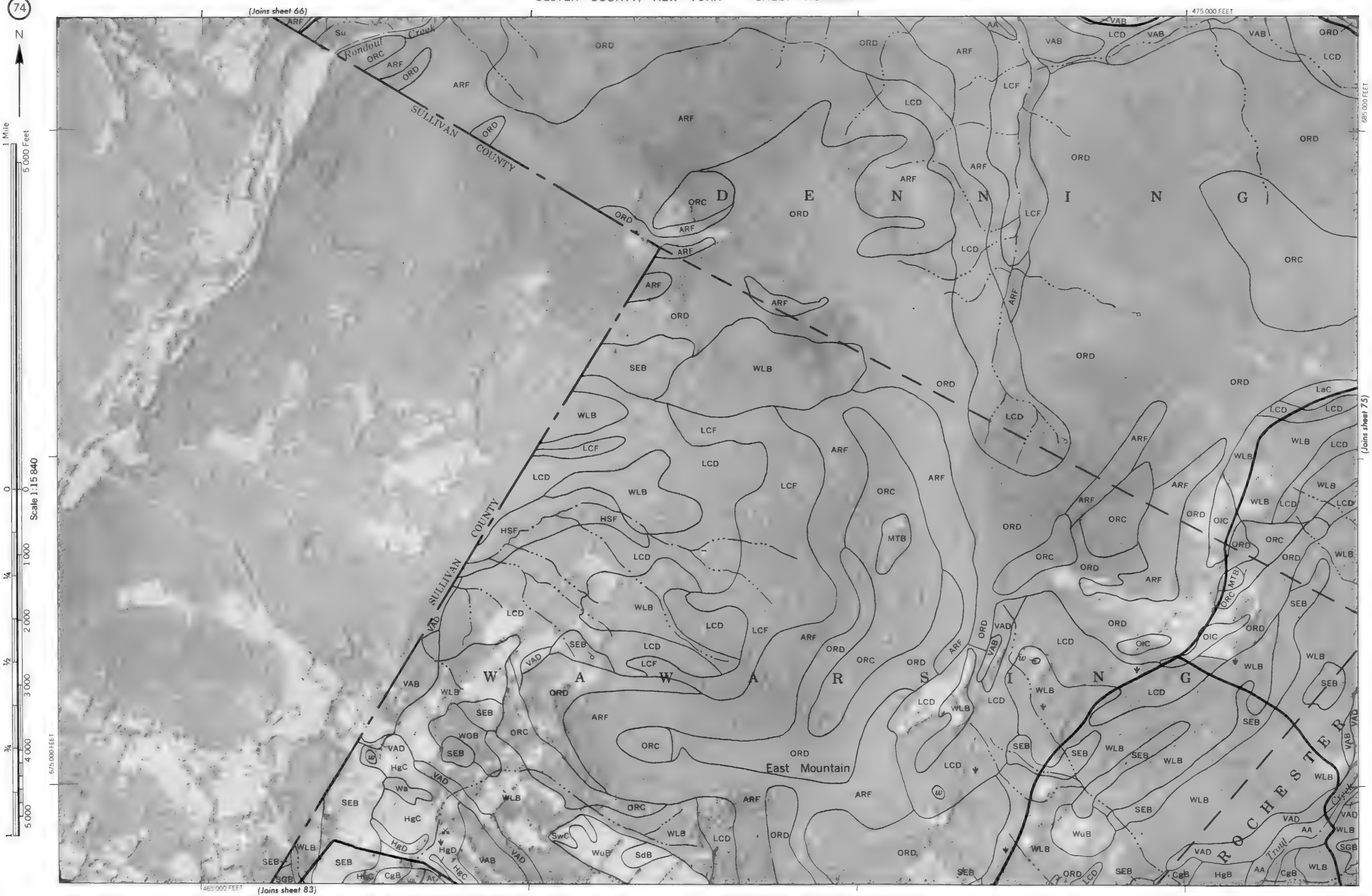
ULSTER COUNTY, NEW YORK — SHEET NUMBER 71



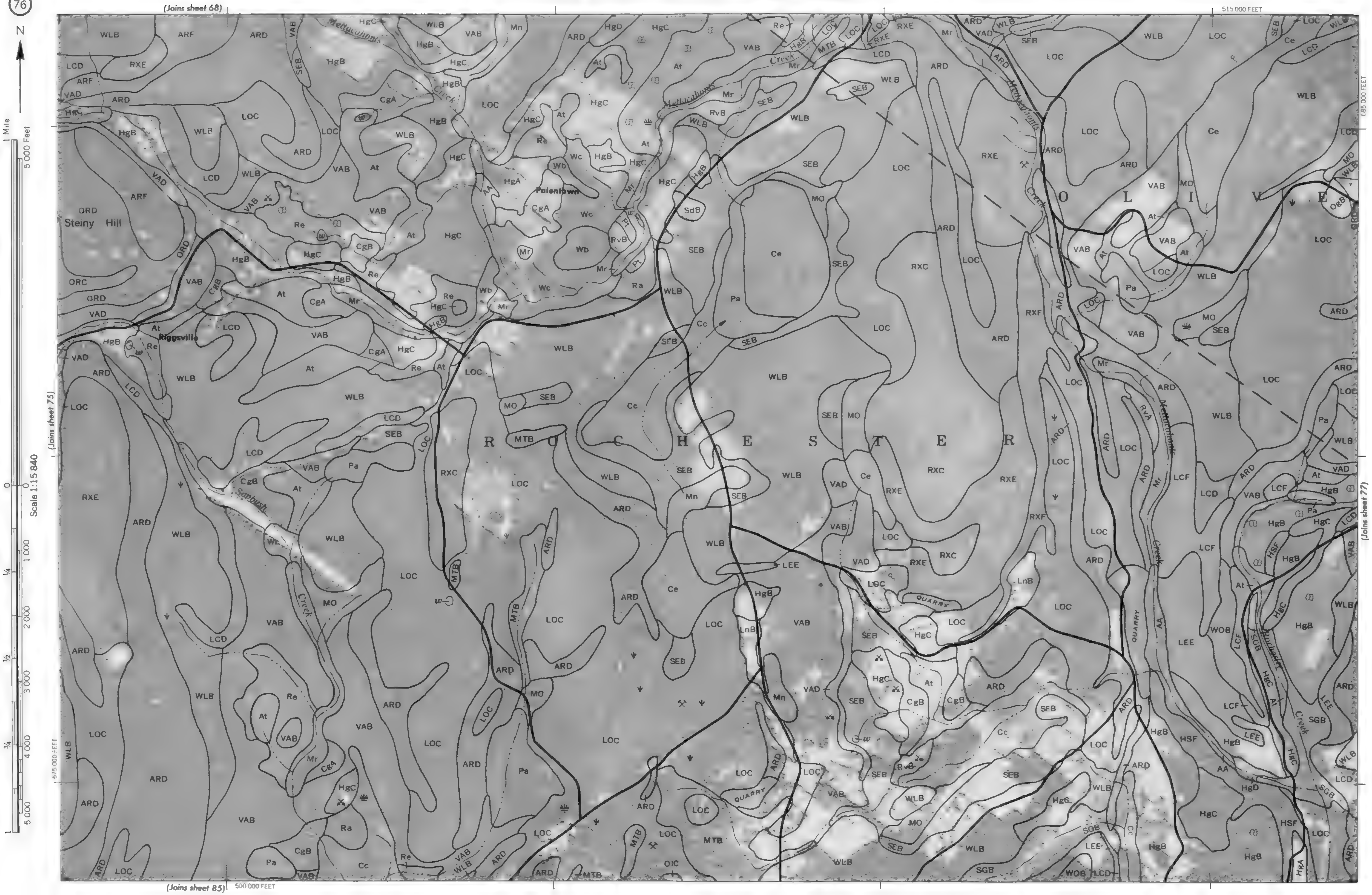

72
N
(Joins sheet 64)
(Joins sheet 80)
(Joins sheet 71)
(Joins sheet 73)
595 000 FEET
580 000 FEET
700 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
KINGSTON
ULSTER
ESOPUS
RONDOUT CREEK
Rondout
Connelly
Wilbur
Eddyville
New Salem
Fly Mtn
Pink Hill
Hollow
Mingo
De Witt Lake
NEW YORK STATE THRUWAY
CONRAIL
CUT AND FILL LAND
QUARRY
GRAVEL PIT
intermittent
water


(Joins inset, lower right)
600 000 FEET
KINGSTON
RONDOUT
CREEK
Sleightsburg
PORT EWEN
HUDSON RIVER
DUTCHESS COUNTY
(Joins sheet 72)
(Joins sheet 81)
605 000 FEET

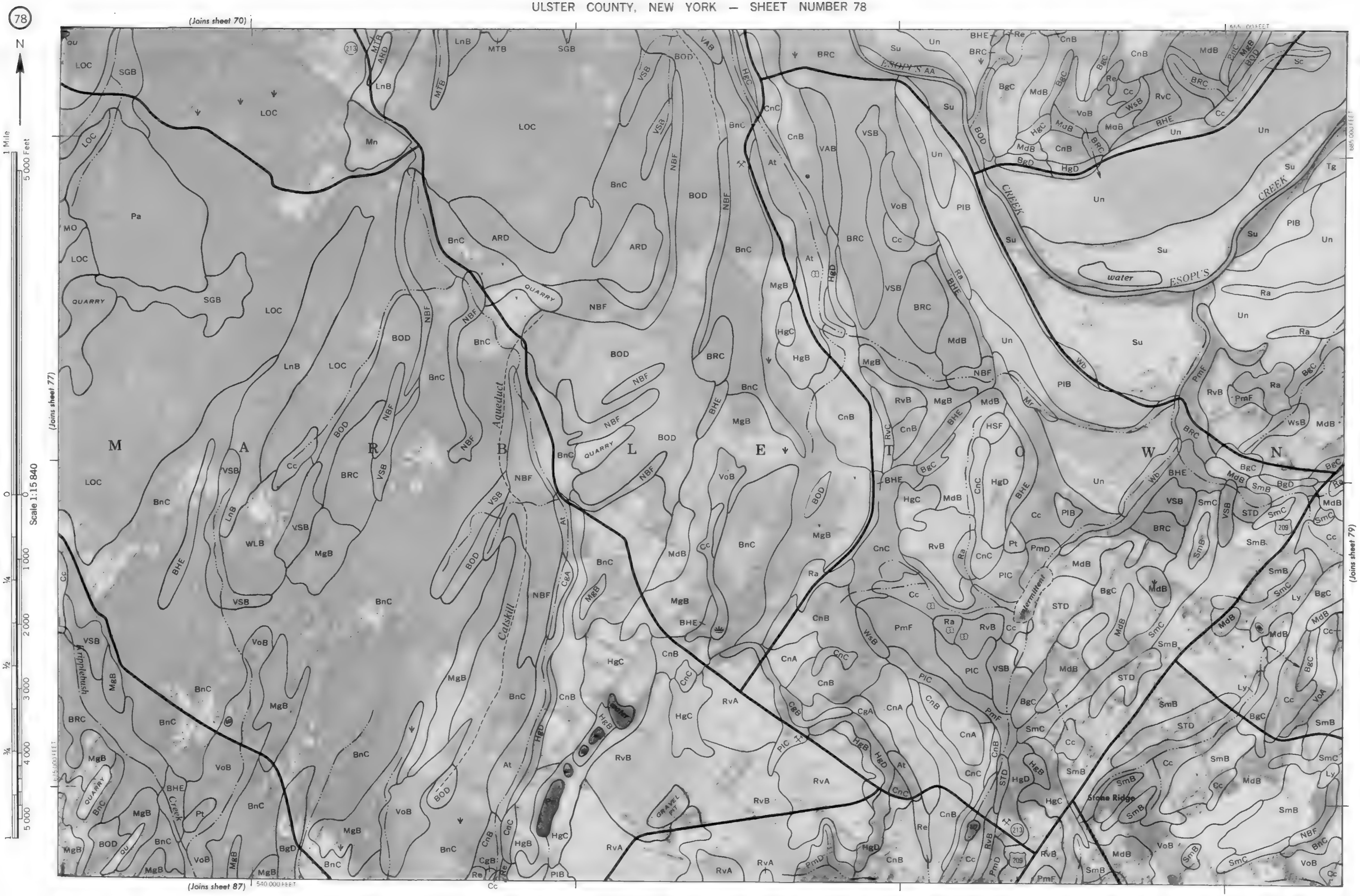

73
598 000 FEET
(Joins sheet 55)
ULSTER
KINGSTON
East Kingston
CLAY PIT
QUARRY
Devils Lake
water
MADE LAND
Kingston Point
CUT AND FILL LAND
RONDOUT CREEK
ESOPUS
(Joins upper left)
(Joins sheet 64)
HUDSON RIVER
DUTCHESS COUNTY
603 000 FEET
N
1 Mile
5 000 Feet
Scale 1:15 840

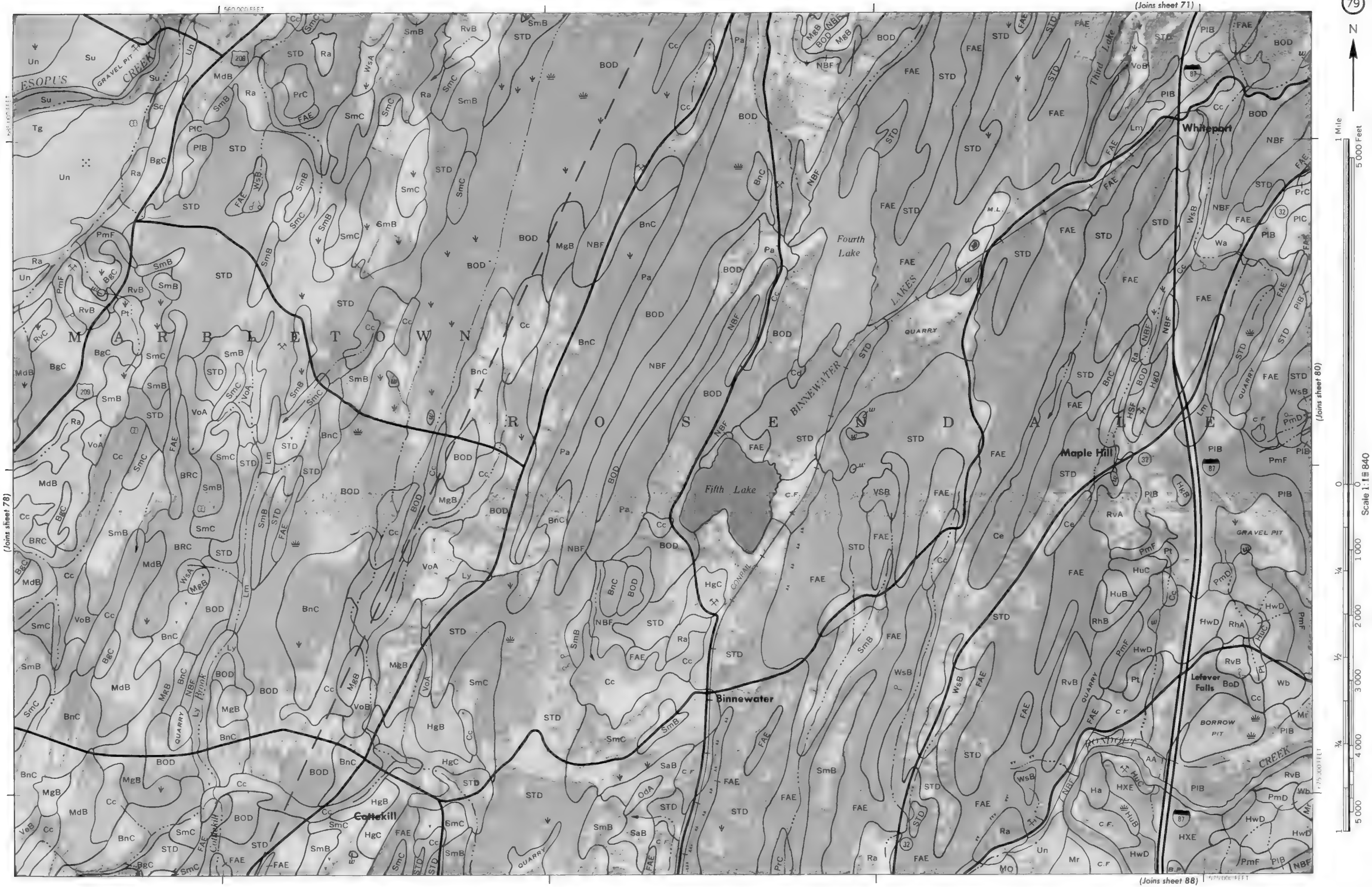

(Joins sheet 66)
(Joins sheet 75)
(Joins sheet 83)
475 000 FEET
685 000 FEET
675 000 FEET
460 000 FEET
N
1 Mile
5 000 Feet
Scale 1:15 840
Rondout Creek
SULLIVAN COUNTY
D E N N I N G
W A W A R S I N G
R O C H E S T E R
East Mountain
Trout Creek
ARF
ORD
ORC
LCD
LCF
VAB
VAD
AA
LaC
WLB
SEB
HSF
MTB
OIC
WOB
HgC
HgB
HgD
HrD
Wa
SwC
WuB
WuB
SdB
CgB
SGB
At
Su


75
N
(Joins sheet 67)
(Joins sheet 74)
(Joins sheet 76)
(Joins sheet 84)
480 000 FEET
D E N N I N G
R O C H E S T E R
Greenville
Balsam Swamp
Flat Hill
Saphush Creek
Vernooy Kill
Mombaccus Creek
Traull Creek
1 Mile
5 000 Feet
Scale 1:15 840


(Joins sheet 68)
515 000 FEET
685 000 FEET
(Joins sheet 75)
(Joins sheet 77)
(Joins sheet 85)
500 000 FEET
675 000 FEET
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000
Steiny Hill
Riggsville
Palentown
Mettacahonts Creek
Sanbush
Creek
Rochester Creek
QUARRY
R O C H E S T E R
O L I V E

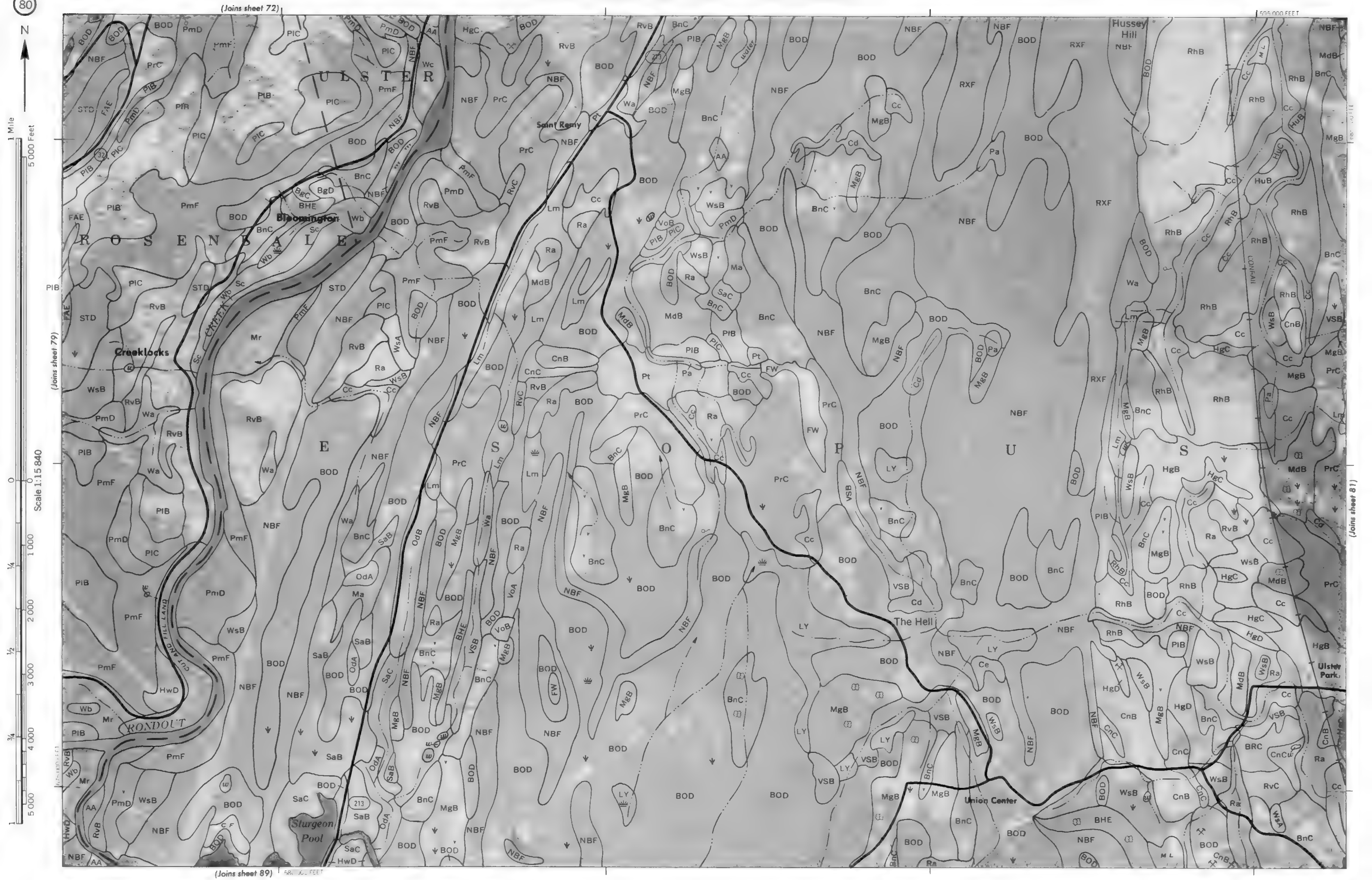

(Joins sheet 69)
(Joins sheet 76)
(Joins sheet 78)
(Joins sheet 86)
520 000 FEET
535 000 FEET
N
1 Mile
5 000 Feet
Scale 1:15 840
O L I V E
M A R B L E T O W N
R O C H E S T E R
Rochester Creek
Vly Swamp
Vly Brook
Roosa Lake
Lyonsville Pond
Lyonsville
QUARRY
intermittent
water


78
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 70)
(Joins sheet 77)
(Joins sheet 79)
(Joins sheet 87)
M A R B L E T O W N
Catskill Aqueduct
ESOPUS CREEK
ESOPUS AA
Kripplebush Creek
Intermittent
Stone Ridge
QUARRY
GRAVEL PIT
water
213
209
540 000 FEET
555 000 FEET
685 000 FEET



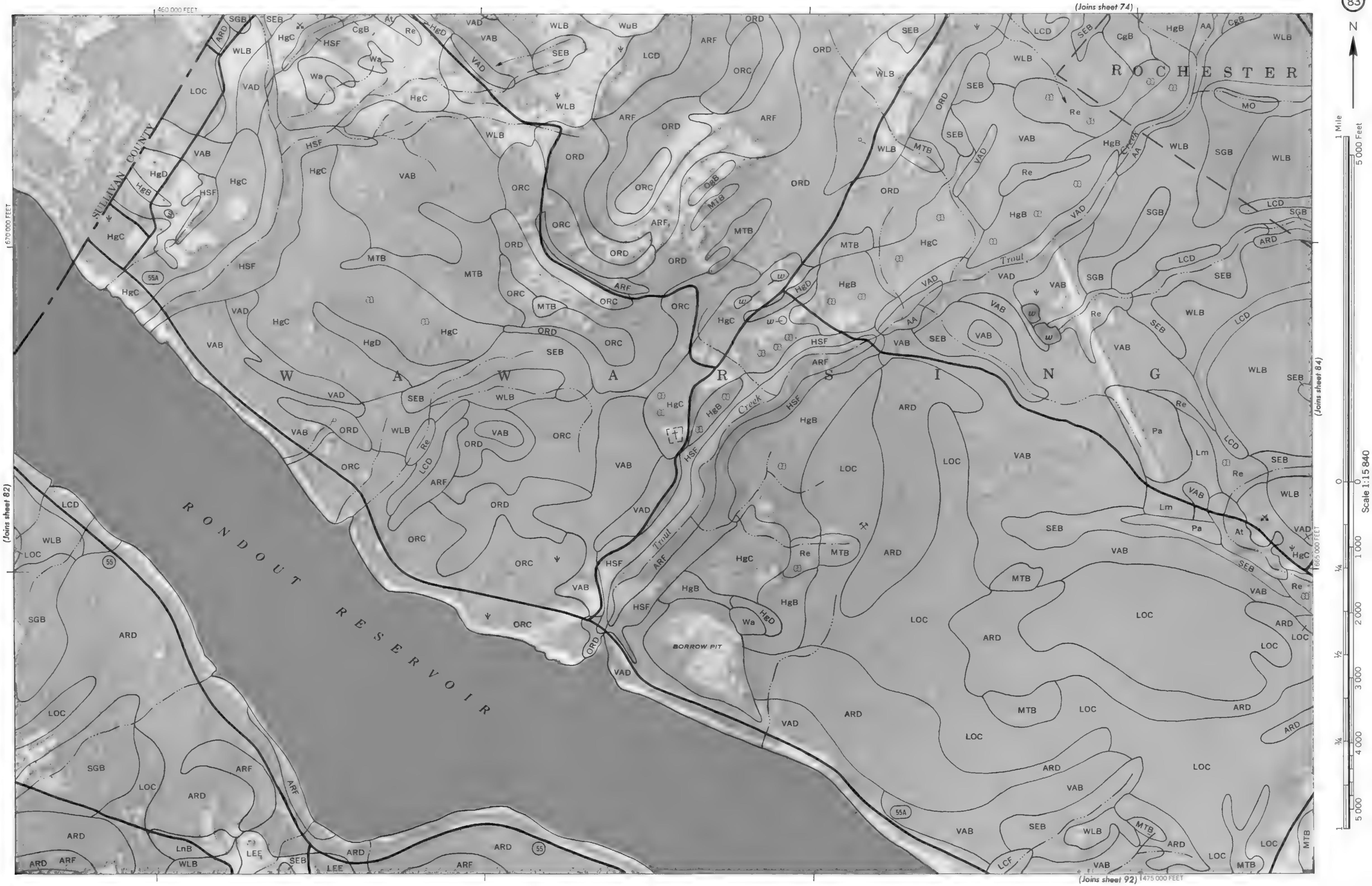
(Joins sheet 71)
(Joins sheet 78)
(Joins sheet 80)
(Joins sheet 88)
N
1 Mile
5 000 Feet
Scale 1:15 840
MARBLETOWN
ROSENDALE
ESOPUS CREEK
GRAVEL PIT
Whiteport
Maple Hill
Binnewater
Cottekill
Lefever Falls
Fourth Lake
Fifth Lake
Third Lake
BINNEWATER LAKES
QUARRY
BORROW PIT
CONRAIL
Brook
Cottekill
CREEK

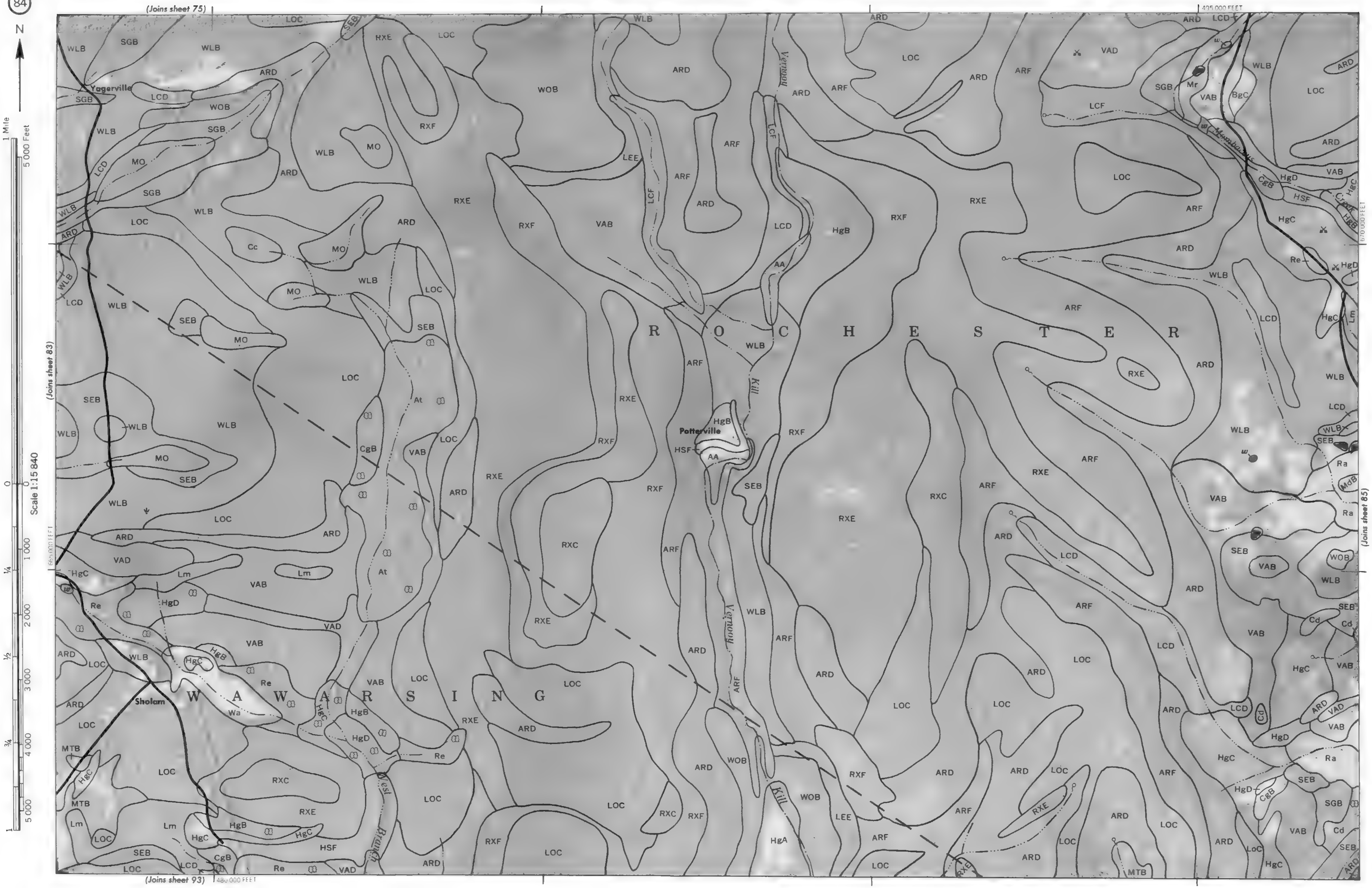
ULSTER COUNTY, NEW YORK — SHEET NUMBER 80



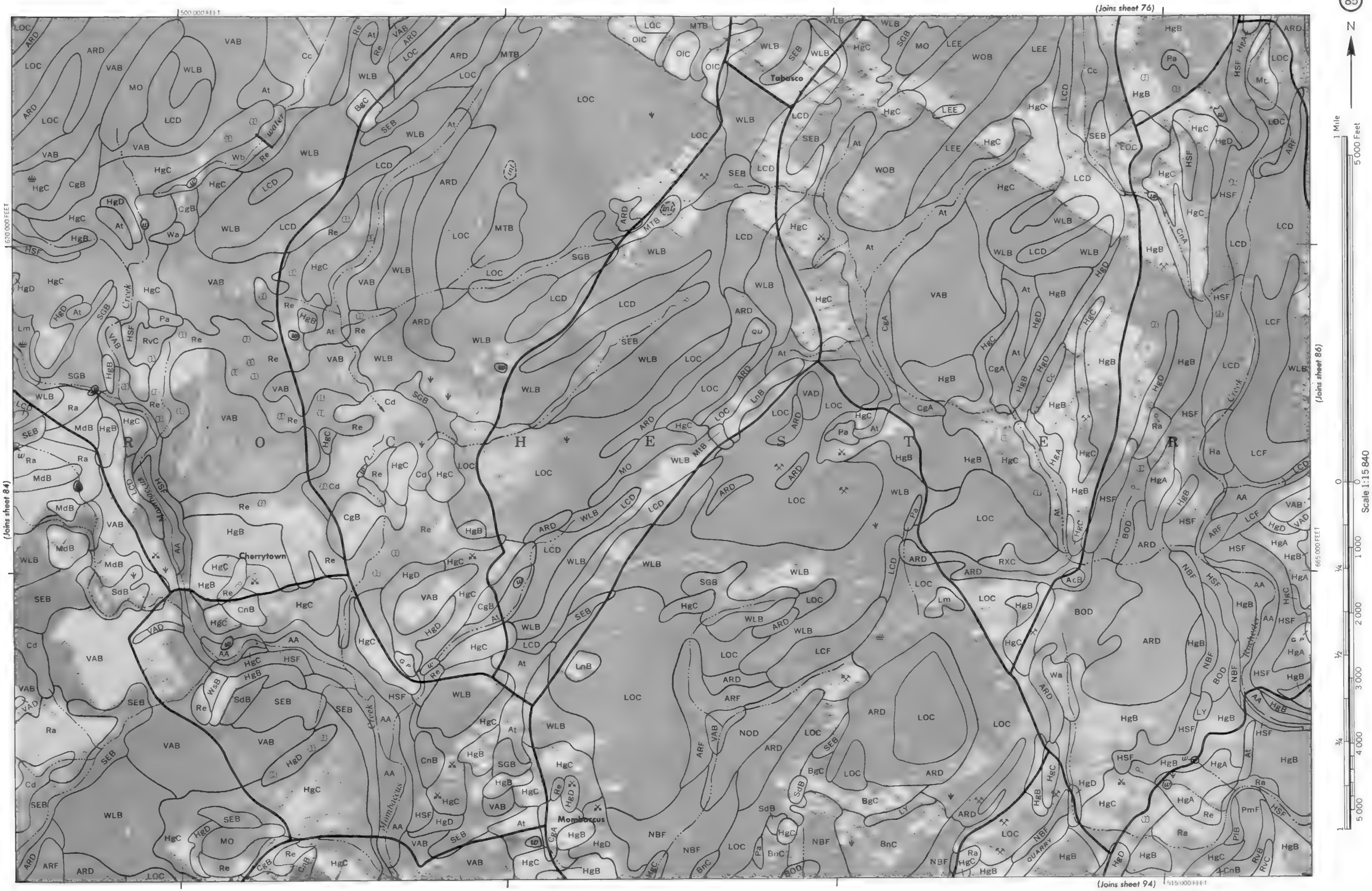

81
N
(Joins sheet 73)
(Joins sheet 80)
(Joins sheet 90)
600 000 FEET
685 000 FEET
615 000 FEET
675 000 FEET
E S O P U S
H U D S O N R I V E R
DUTCHESS COUNTY
Esopus Lake
Mirror Lake
Prospect Hill
Esopus Meadows Point
Cave Point
Ulster Park
9W
NBF
MdB
MgB
BnC
Lm
Wa
PrC
Ce
BOD
Cd
PlB
Pa
BgC
BgD
Pt
BHE
HXE
HwD
RhB
HuC
RvC
VoB
WsB
Cc
HgC
HgD
RXB
AA
HSF
G.P
Ra
RvB
WsA
HgB
CnC
C.F.
Scale 1:15 840
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000


82
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
¼
2 000
½
3 000
¾
4 000
5 000
1
455 000 FEET
670 000 FEET
665 000 FEET
440 000 FEET
RONDOUT RESERVOIR
SULLIVAN COUNTY
W A W A R S I N G
55
LCD
WLB
LOC
ARD
SGB
SEB
ARF
Re
(Joins sheet 83)
(Joins sheet 91)


83
(Joins sheet 74)
(Joins sheet 82)
(Joins sheet 84)
(Joins sheet 92)
460 000 FEET
670 000 FEET
665 000 FEET
475 000 FEET
ROCHESTER
WAWARSING
RONDOUT RESERVOIR
SULLIVAN COUNTY
Trout Creek
BORROW PIT
55
55A
N
Scale 1:15 840
1 Mile
5 000 Feet



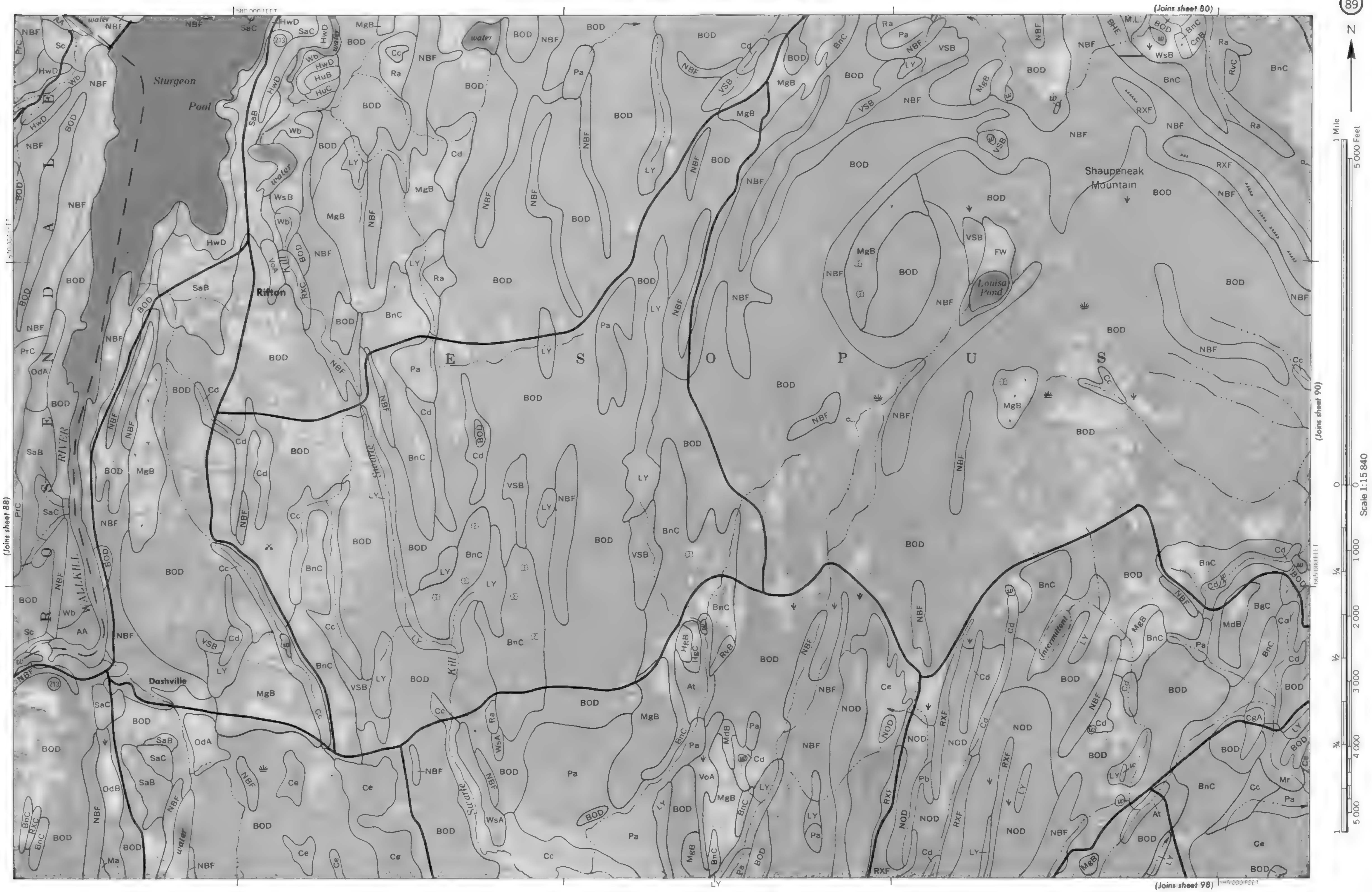
N
(Joins sheet 75)
(Joins sheet 83)
(Joins sheet 85)
(Joins sheet 93)
405 000 FEET
670 000 FEET
480 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
Yagerville
Potterville
Sholam
R O C H E S T E R
W A W A R S I N G
Vernooy Kill
Mombaccus Creek
West Branch

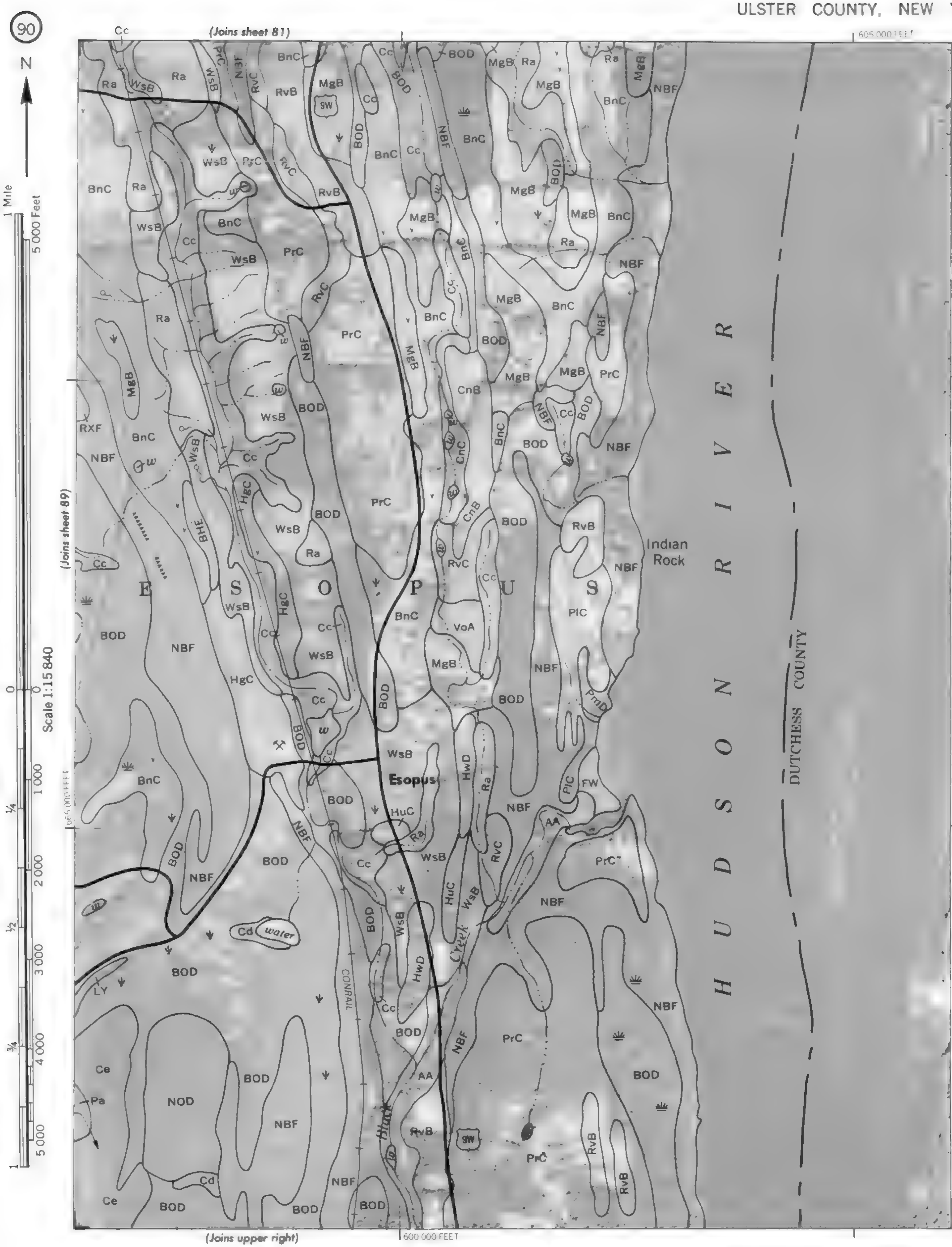

85
(Joins sheet 76)
(Joins sheet 84)
(Joins sheet 86)
(Joins sheet 94)
500 000 FEET
670 000 FEET
665 000 FEET
515 000 FEET
N
Tabasco
Cherrytown
Mombaccus
ROCHESTER
1 Mile
5 000 Feet
Scale 1:15 840


N
1 Mile
5 000 Feet
Scale 1:15 840
0
1000
2000
3000
4000
5000
¼
½
¾
1
(Joins sheet 77)
(Joins sheet 85)
(Joins sheet 87)
(Joins sheet 95)
535 000 FEET
520 000 FEET
670 000 FEET
665 000 FEET
M A R B L E T O W N
R O C H E S T E R
Mettacahonts
Whitfield
WHITFIELD CEMETERY
North Peters Kill
Rochester Creek
Vly
Brook
QUARRY
water
209

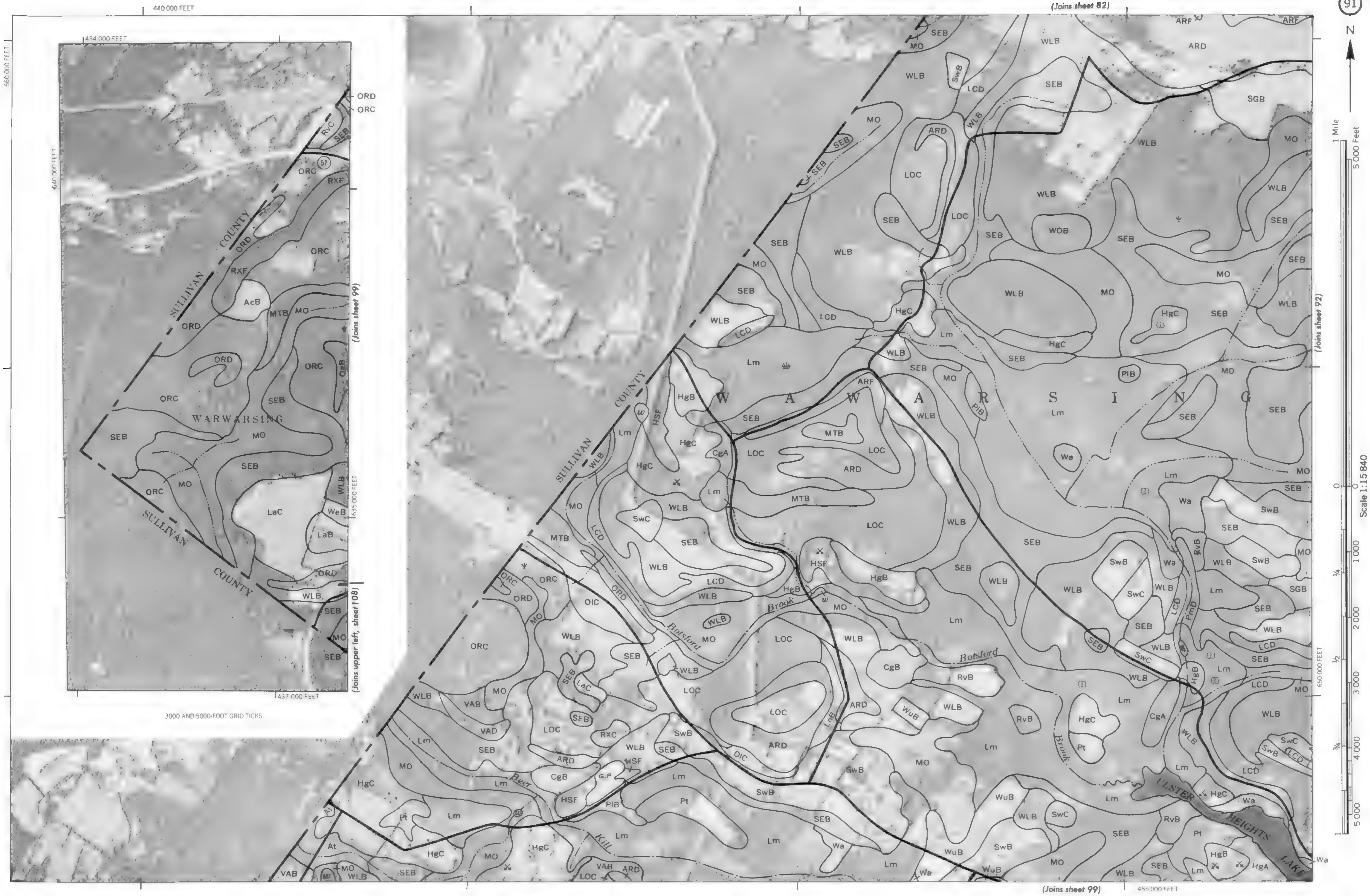

87
N
(Joins sheet 78)
(Joins sheet 88)
(Joins sheet 96)
(Joins sheet 86)
540 000 FEET
555 000 FEET
670 000 FEET
Kripplebush
High Falls
ROSENDALE
M A R B L E T O W N
R O C H E S T E R
RONDOUT CREEK
ABANDONED CANAL
HIGH FALLS CEMETERY
GRAVEL PIT
MADE LAND
Intermittent
water
Coxing Kill
1 Mile
5 000 Feet
Scale 1:15 840


(Joins sheet 79)
(Joins sheet 87)
(Joins sheet 89)
(Joins sheet 97)
N
1 Mile
5 000 Feet
Scale 1:15 840
MARBLETOWN
Rosendale
Lawrenceville
Bruceville
High Falls
Tillson
ROSENDALE
SHAWANGUNK
MOUNTAINS
ESOPUS
Rondout Creek
Coxing Kill
WALLKILL RIVER
CANAL
ABANDONED
GRAVEL PIT
BORROW PIT
CUT AND FILL LAND
CORRAIL

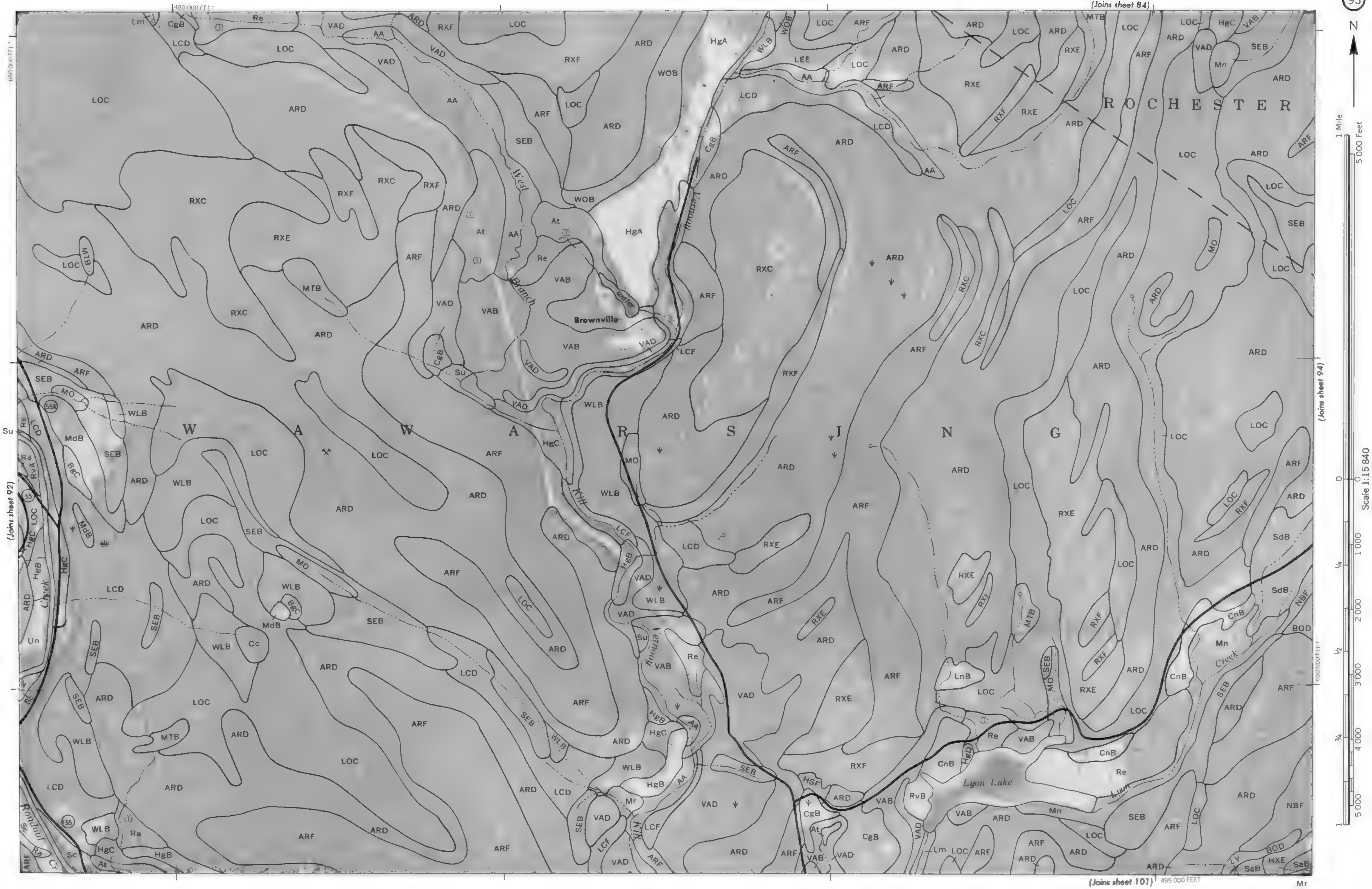

89
N
(Joins sheet 80)
(Joins sheet 88)
(Joins sheet 90)
(Joins sheet 98)
580 000 FEET
Sturgeon Pool
Rifton
Dashville
Shaupeneak Mountain
Louisa Pond
E S O P U S
WALLKILL RIVER
Swarte Kill
1 Mile
5 000 Feet
Scale 1:15 840


90
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 81)
(Joins sheet 89)
(Joins upper right)
605 000 FEET
670 000 FEET
600 000 FEET
E S O P U S
Esopus
Indian Rock
HUDSON RIVER
DUTCHESS COUNTY
CONRAIL
Black Creek
water

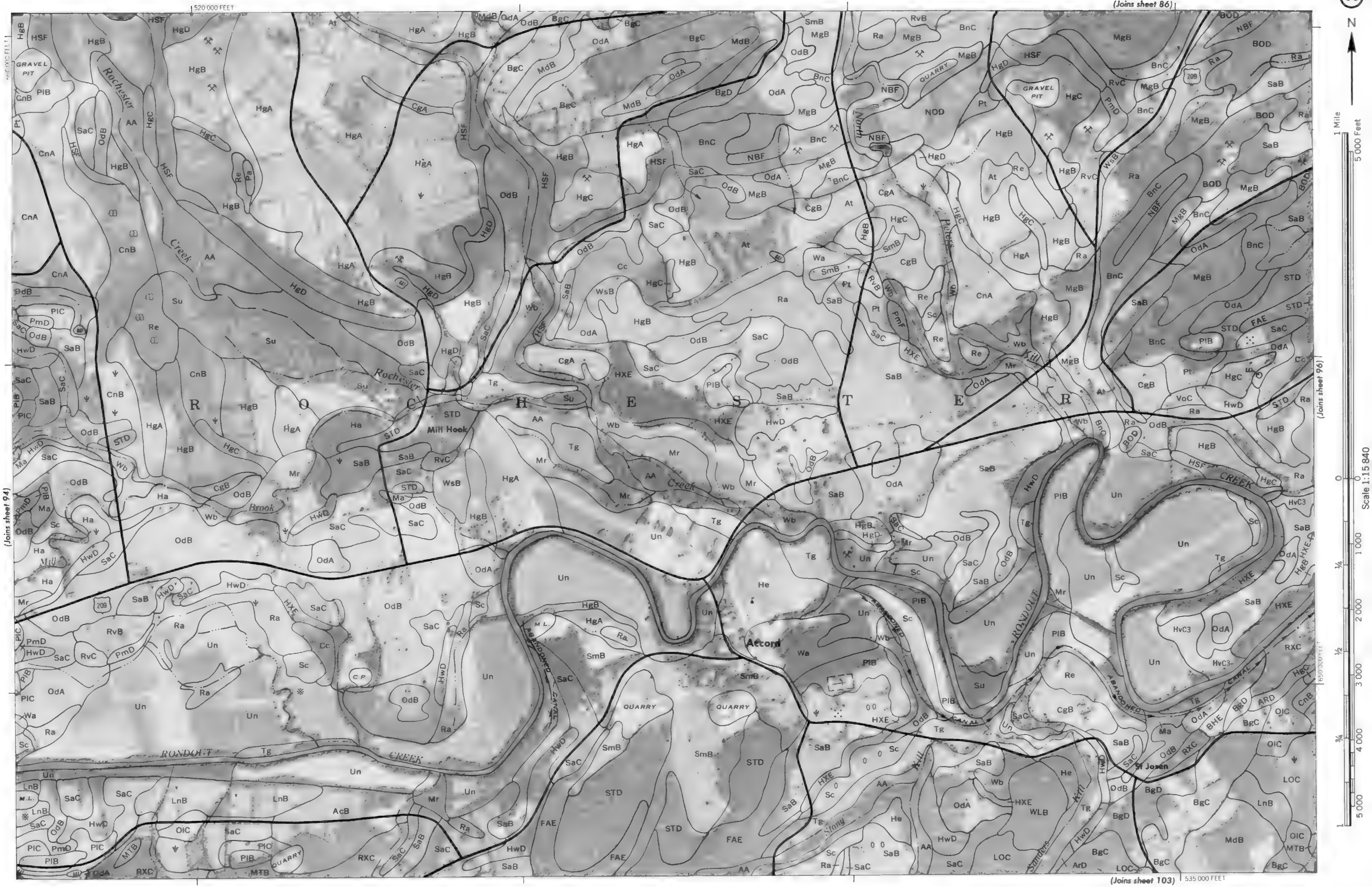

(Joins lower left)
(Joins sheet 98)
(Joins sheet 107)
605 000 FEET
660 000 FEET
600 000 FEET
E S O P U S
West Park
GRAVEL PIT
Black Creek
water
HUDSON RIVER
DUTCHESS COUNTY
CONRAIL
LLOYD

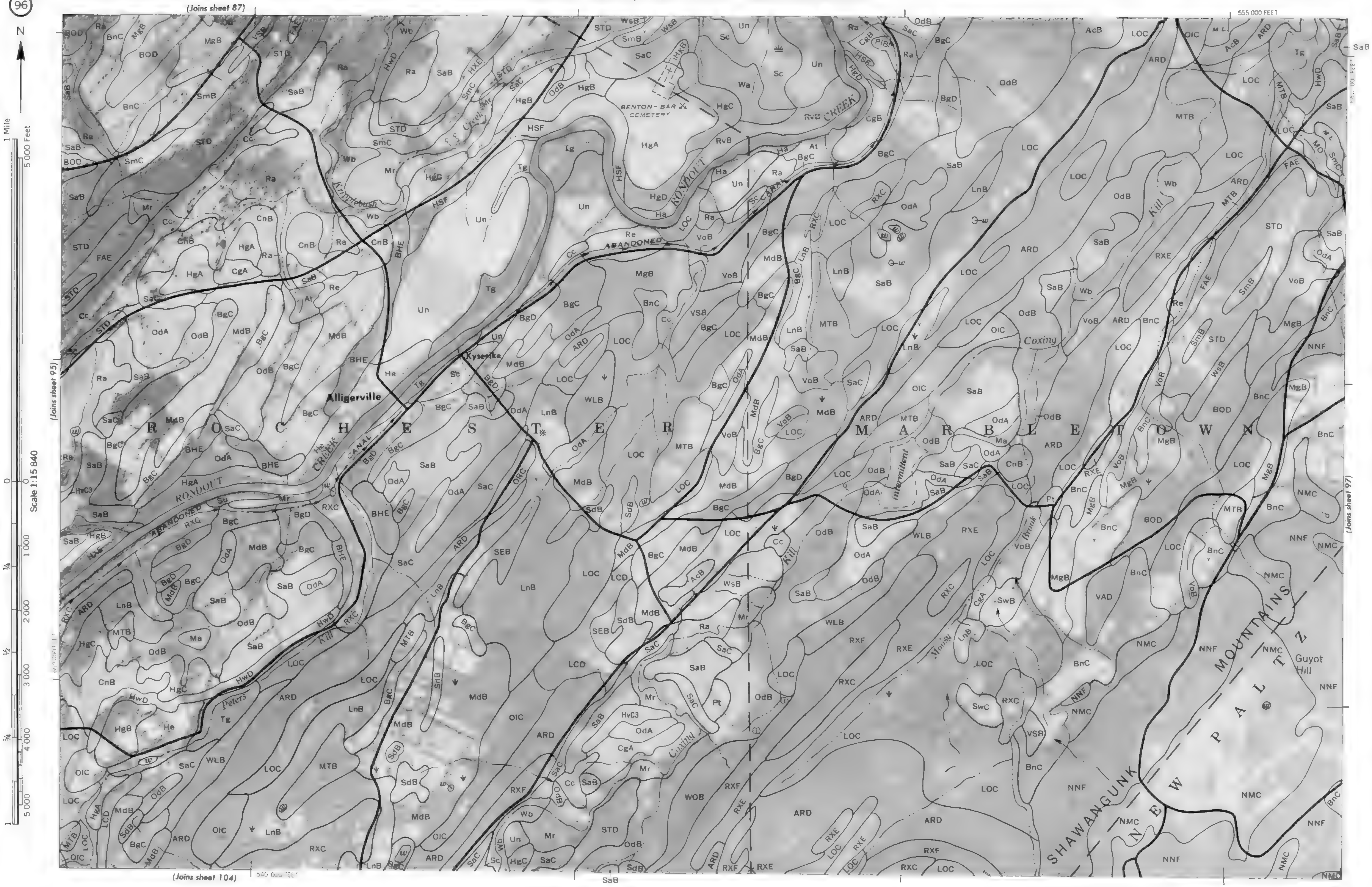

(Joins sheet 82)
(Joins sheet 92)
(Joins sheet 99)
(Joins upper left, sheet 108)
440 000 FEET
434 000 FEET
437 000 FEET
455 000 FEET
650 000 FEET
640 000 FEET
635 000 FEET
660 000 FEET
3000 AND 5000-FOOT GRID TICKS
SULLIVAN COUNTY
WARWARSING
W A W A R S I N G
ULSTER HEIGHTS LAKE
Botsford Brook
Beer Kill
N
Scale 1:15 840
1 Mile
5 000 Feet

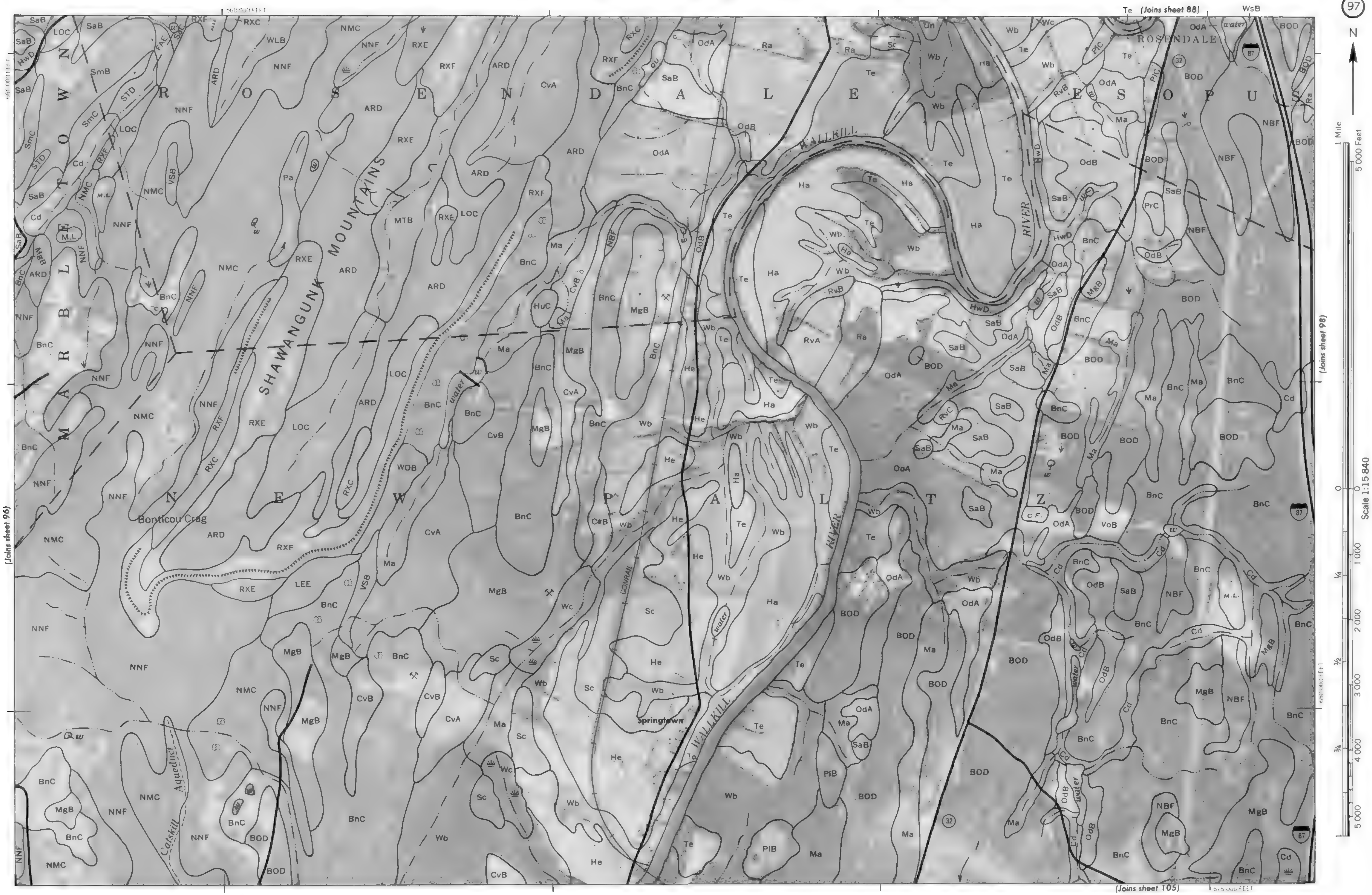

N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 83)
(Joins sheet 91)
(Joins sheet 93)
(Joins sheet 100)
RONDOUT RESERVOIR
MERRIMAN DAM
CUT AND FILL LAND
MADE LAND
Water
WAWARSING
Brook
Brandy
Rondout Creek
Lackawack
55
55A
460 000 FEET
650 000 FEET

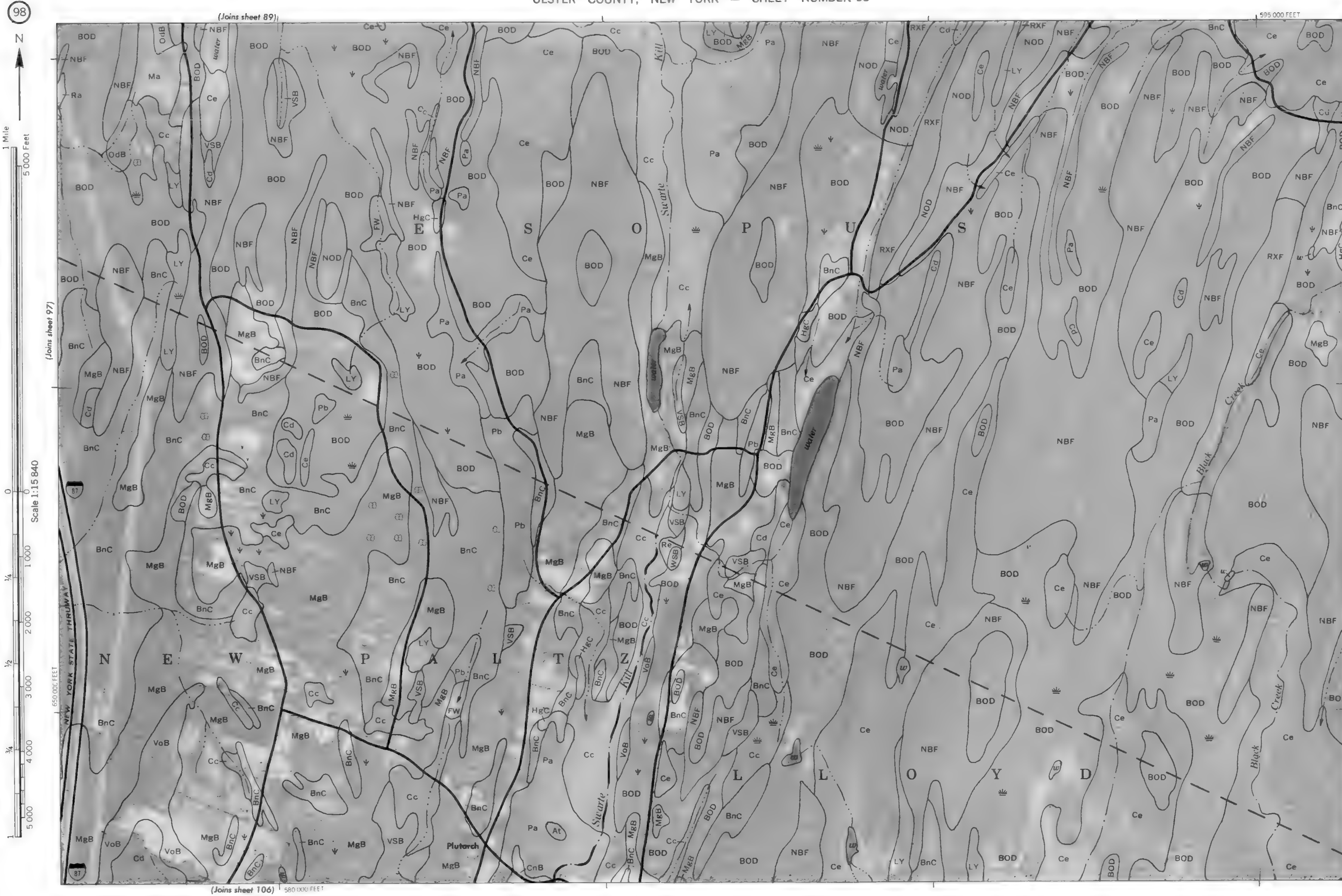

(Joins sheet 84)
(Joins sheet 92)
(Joins sheet 94)
(Joins sheet 101)
480 000 FEET
495 000 FEET
N
ROCHESTER
WAWARSING
Brownville
Lyon Lake
West Branch
Rondout Creek
Lyon Creek
Kill
1 Mile
5 000 Feet
Scale 1:15 840

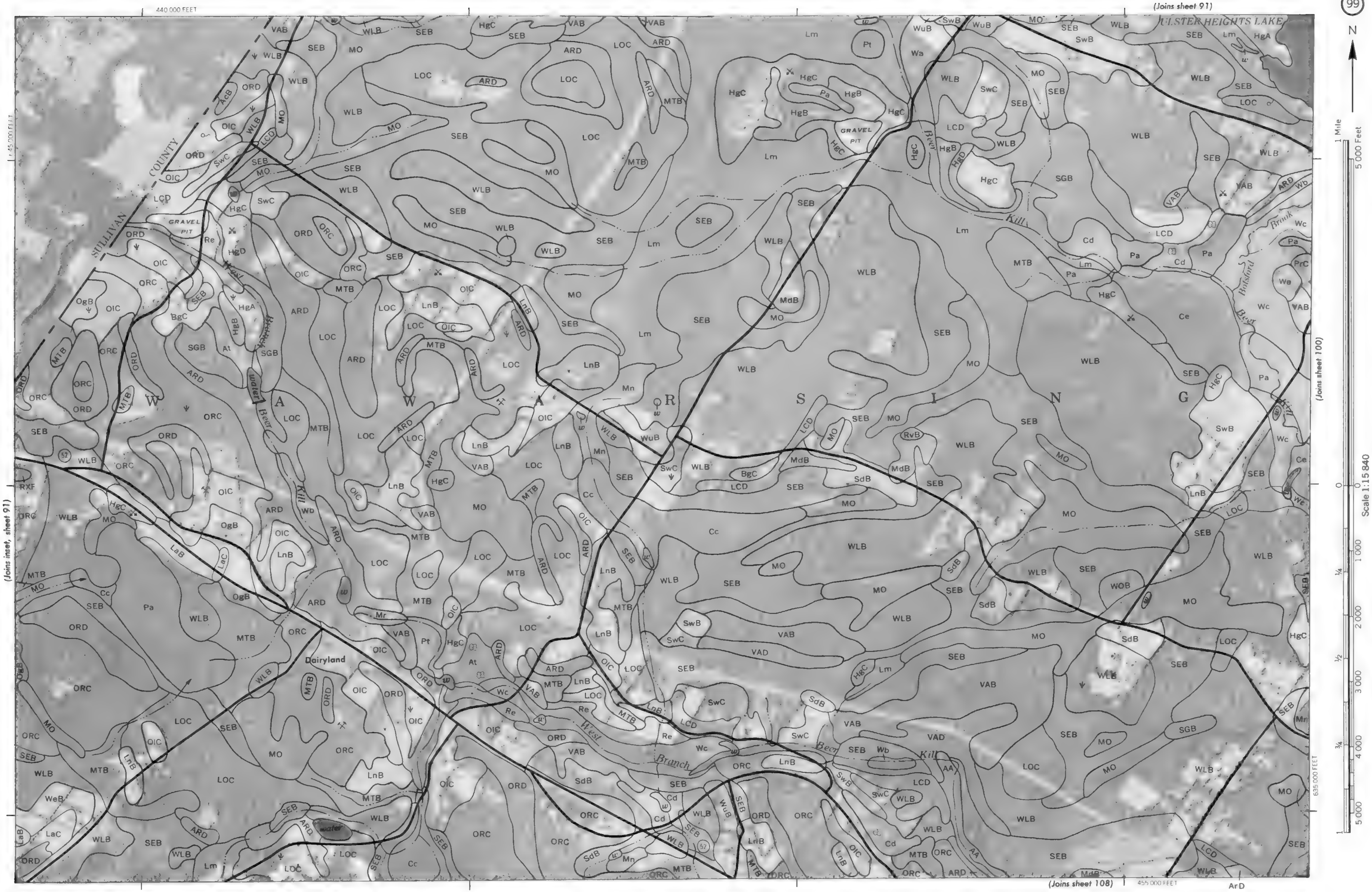

(Joins sheet 85)
(Joins sheet 93)
(Joins sheet 95)
(Joins sheet 102)
515 000 FEET
500 000 FEET
N
Scale 1:15 840
1 Mile
5 000 Feet
R O C H E S T E R
W A W A R S I N G
Fantinekill
Pataukunk
Pine Bush
Rondout Creek
ABANDONED CANAL
Mill Brook
Monbaccus Creek
GRAVEL PIT
209

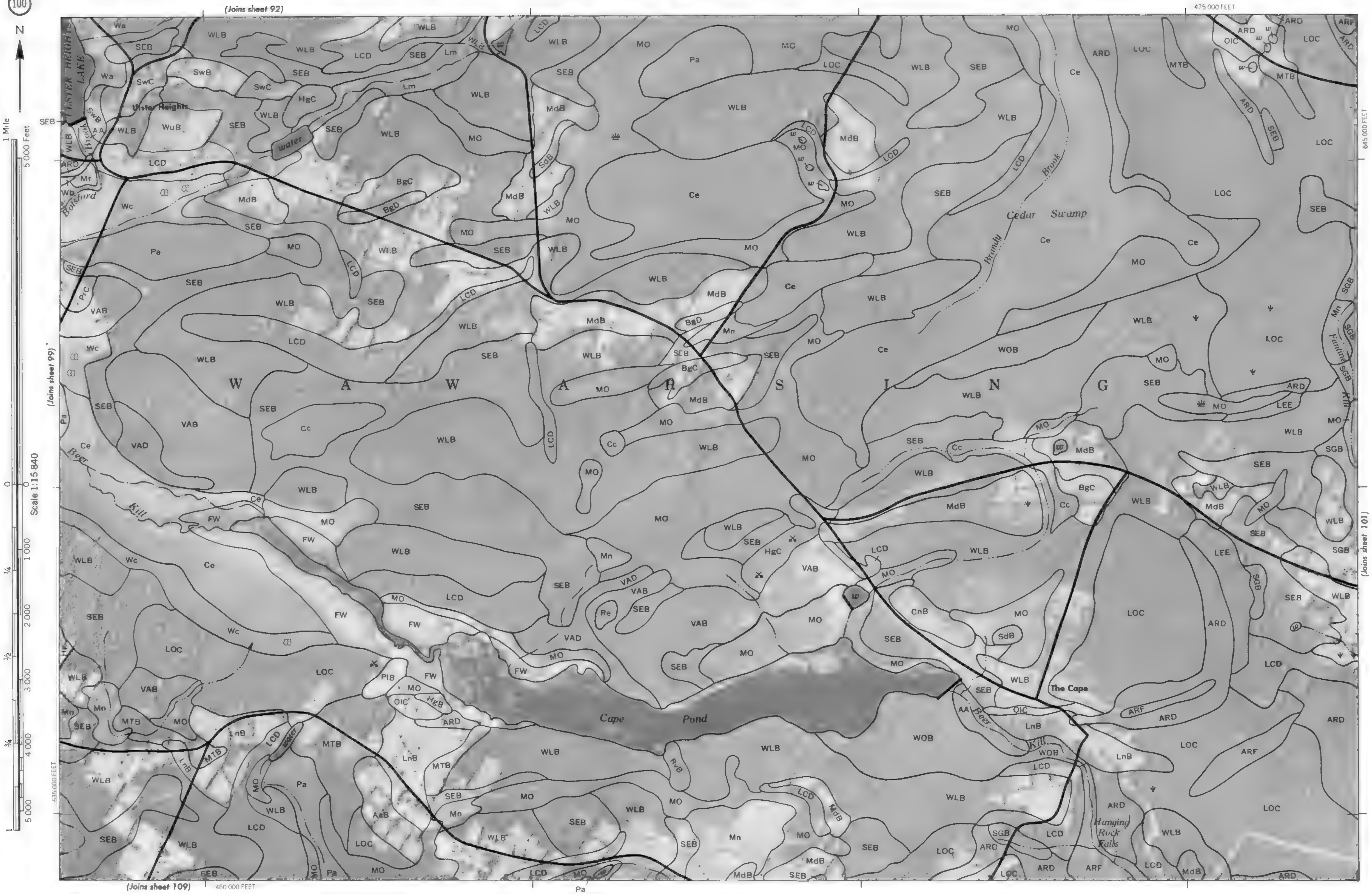

95
N
(Joins sheet 86)
(Joins sheet 94)
(Joins sheet 96)
(Joins sheet 103)
520 000 FEET
535 000 FEET
R O C H E S T E R
Mill Hook
Accord
St Josen
Rochester Creek
Mill Brook
Rondout Creek
Peters Kill
Stony Kill
Sanders Kill
ABANDONED CANAL
QUARRY
GRAVEL PIT
1 Mile
5 000 Feet
Scale 1:15 840

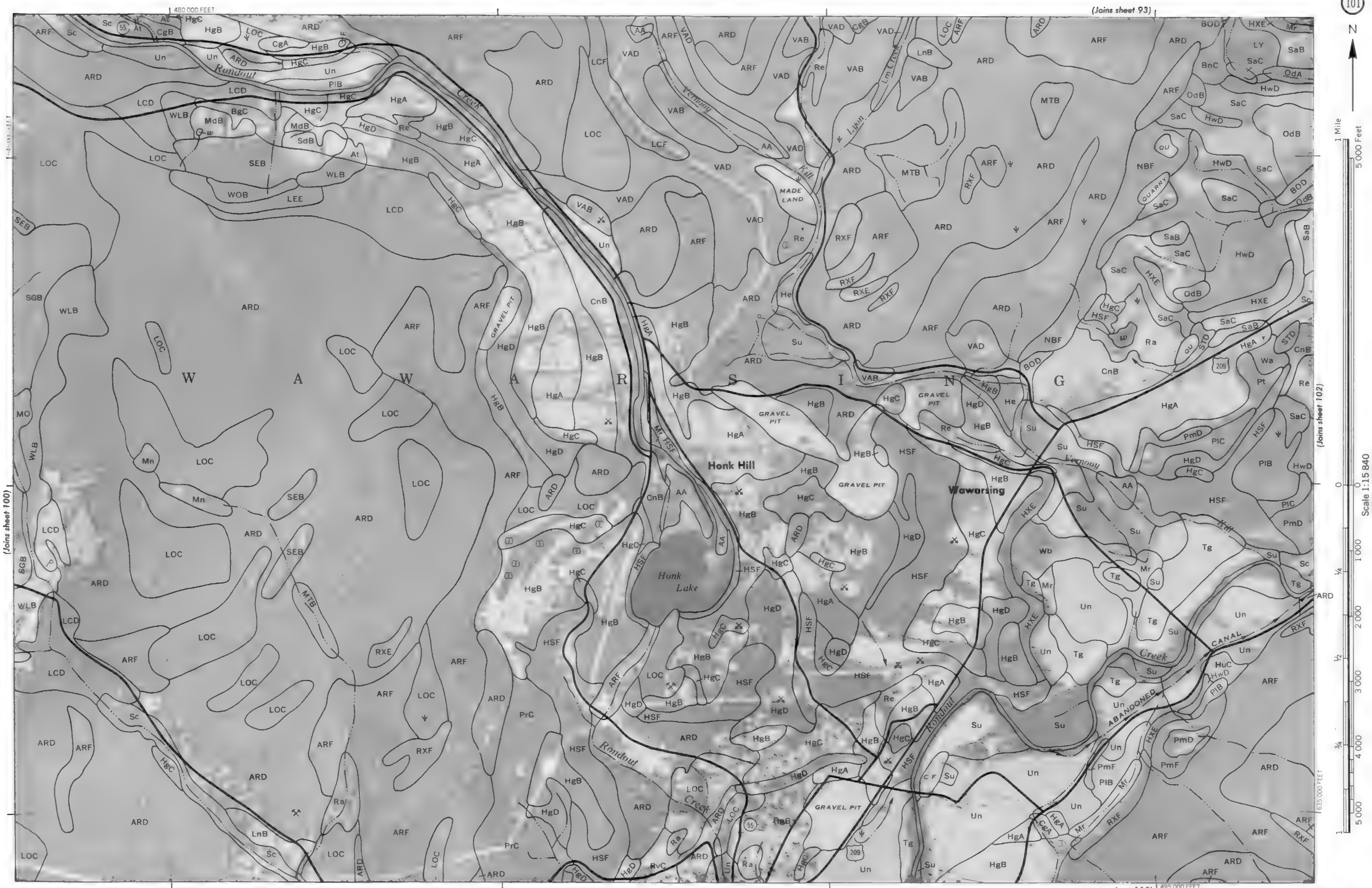

96
N
(Joins sheet 87)
(Joins sheet 95)
(Joins sheet 97)
(Joins sheet 104)
555 000 FEET
540 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
ROCHESTER
MARBLETOWN
NEW PALTZ
SHAWANGUNK MOUNTAINS
Alligerville
Kyserike
Guyot Hill
BENTON-BAR CEMETERY
RONDOUT CREEK
ABANDONED CANAL
Kripplebush Creek
Coxing Kill
Peters Kill
Mossy Brook
intermittent

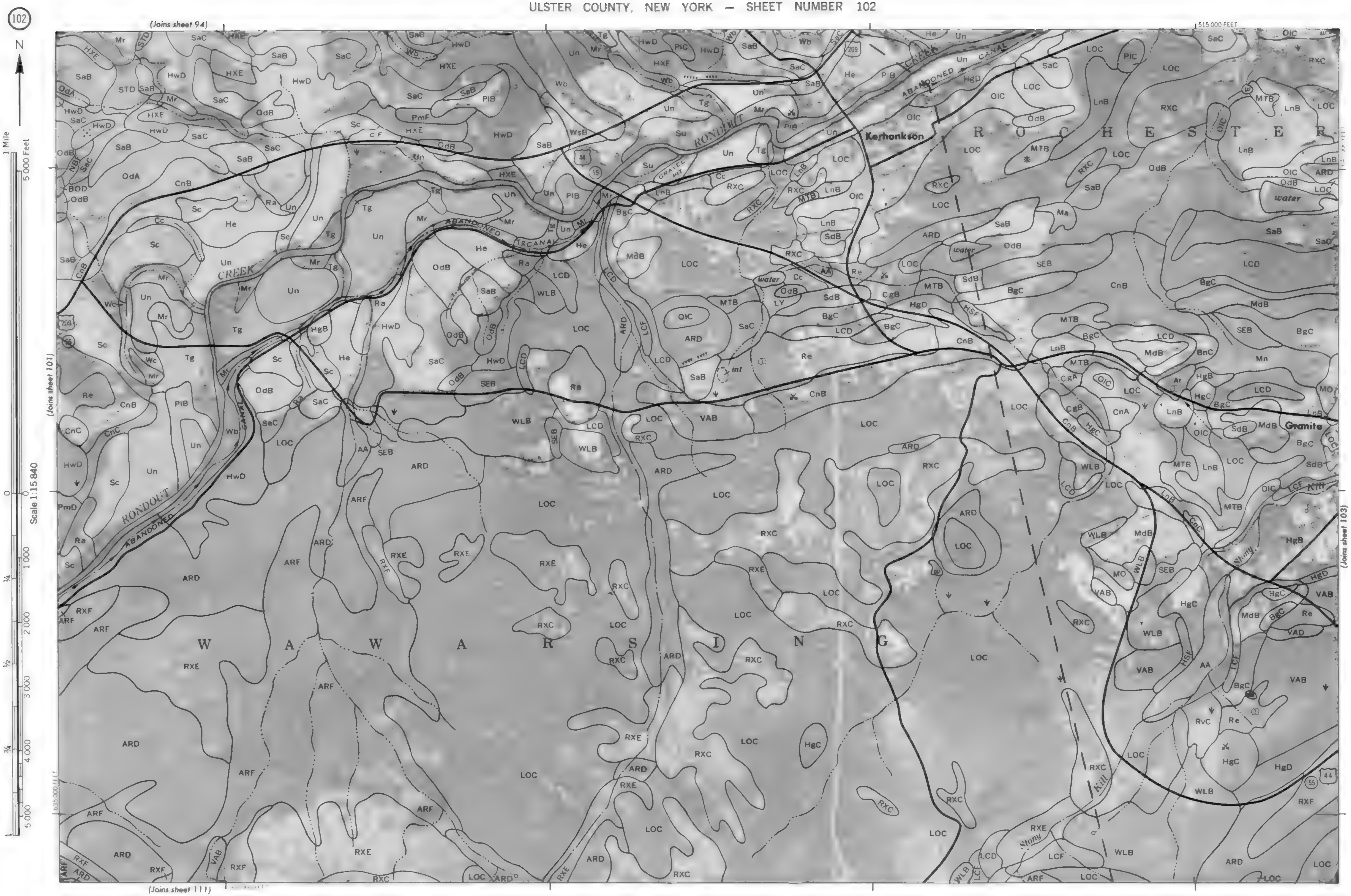

97
N
(Joins sheet 88)
(Joins sheet 98)
(Joins sheet 105)
(Joins sheet 96)
ROSENDALE
ESOPUS
MARBLETOWN
NEW PALTZ
SHAWANGUNK MOUNTAINS
WALLKILL RIVER
Bonticou Crag
Springtown
Catskill Aqueduct
CONRAIL
Scale 1:15 840
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1000
2000
3000
4000
5000

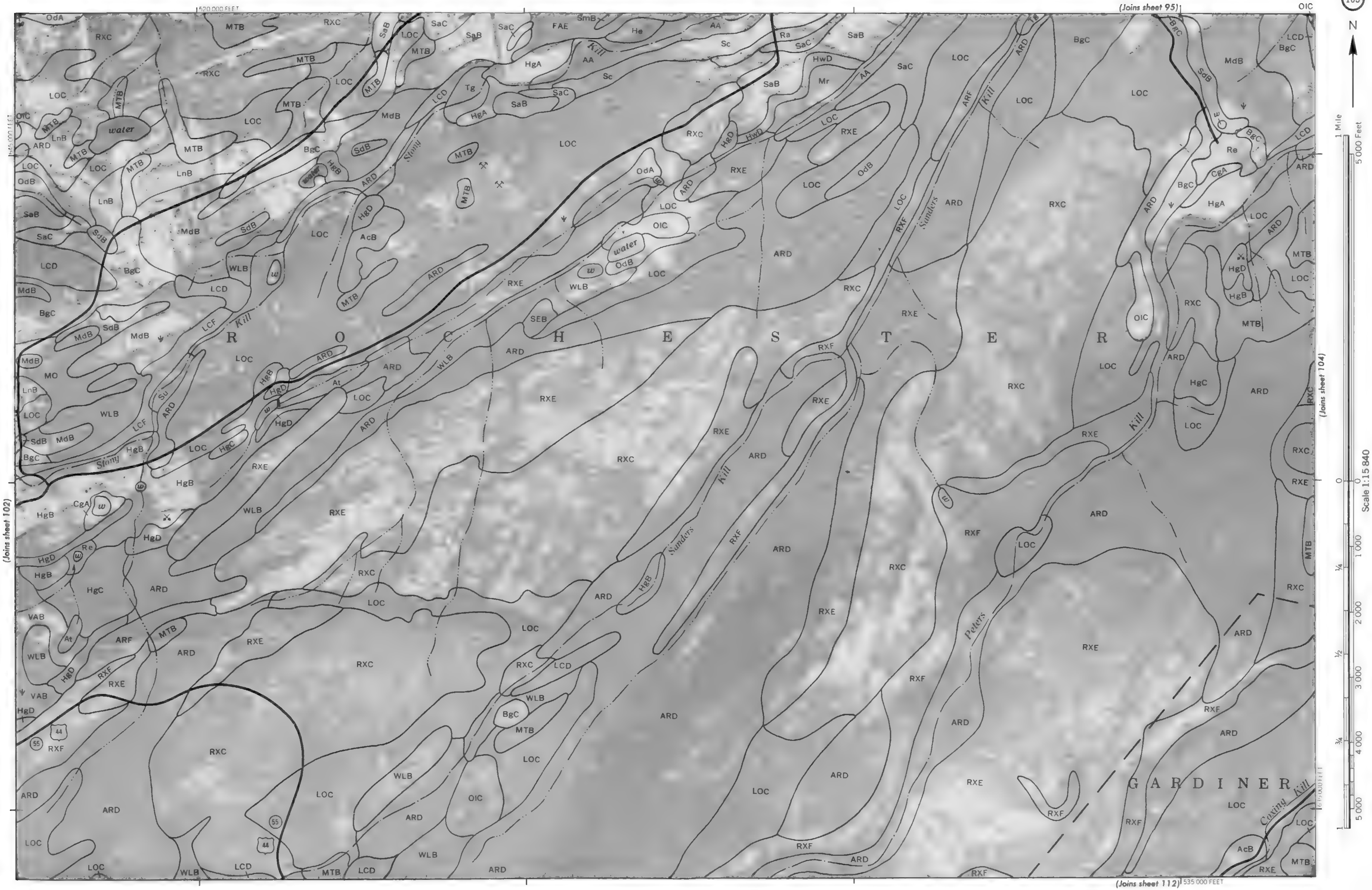

98
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 89)
(Joins sheet 97)
(Joins inset, sheet 90)
(Joins sheet 106)
595 000 FEET
560 000 FEET
650 000 FEET
580 000 FEET
ESOPUS
NEW PALTZ
LLOYD
NEW YORK STATE THRUWAY
Swarte Kill
Black Creek
Plutarch
water
87


(Joins sheet 91)
440 000 FEET
ULSTER HEIGHTS LAKE
SULLIVAN COUNTY
GRAVEL PIT
W A W A R S I N G
Dairyland
West Branch Beer Kill
Beer Kill
Brook
Botsford
(Joins sheet 100)
(Joins inset, sheet 91)
(Joins sheet 108)
455 000 FEET
635 000 FEET
N
1 Mile
5 000 Feet
Scale 1:15 840
water
57

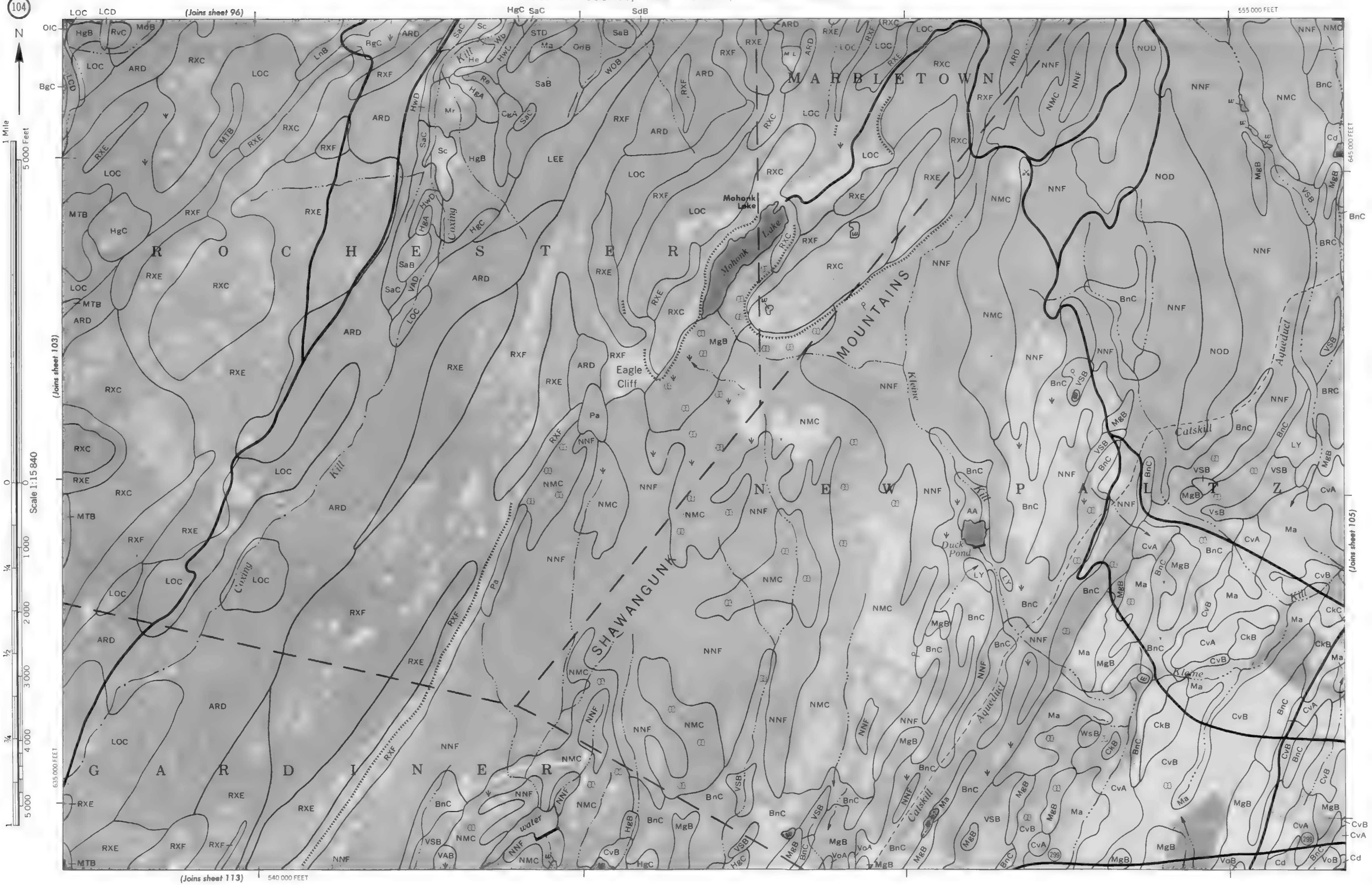

(Joins sheet 92)
(Joins sheet 99)
(Joins sheet 101)
(Joins sheet 109)
475 000 FEET
645 000 FEET
635 000 FEET
460 000 FEET
N
1 Mile
5 000 Feet
Scale 1:15 840
ULSTER HEIGHTS LAKE
Ulster Heights
Botsford
Beer Kill
Cedar Swamp
Brandy Brook
Fantine Kill
W A W A R S I N G
Cape Pond
The Cape
Hanging Rock Falls
water


101
N
(Joins sheet 93)
(Joins sheet 100)
(Joins sheet 102)
(Joins sheet 110)
480 000 FEET
495 000 FEET
635 000 FEET
W A W A R S I N G
Honk Hill
Honk Lake
Wawarsing
Rondout Creek
Vernooy Kill
Lyon Creek
MADE LAND
GRAVEL PIT
QUARRY
ABANDONED CANAL
1 Mile
5 000 Feet
Scale 1:15 840
0
1000
2000
3000
4000
5000
¼
½
¾
1

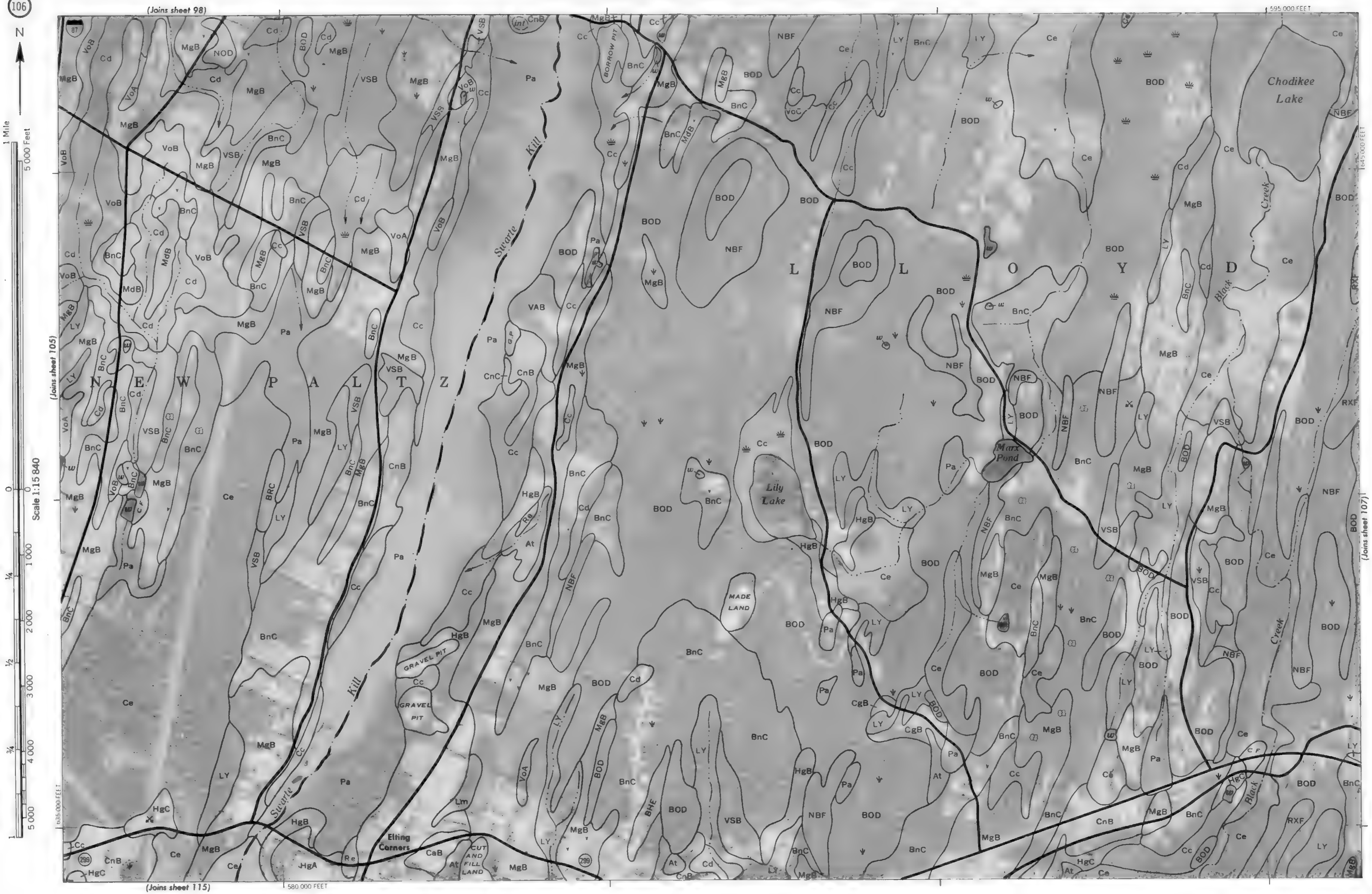

102
N
(Joins sheet 94)
(Joins sheet 101)
(Joins sheet 103)
(Joins sheet 111)
515 000 FEET
635 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
Kerhonkson
Granite
R O C H E S T E R
W A W A R S I N G
RONDOUT CREEK
ABANDONED CANAL
GRAVEL PIT
Stony Kill
LCF Kill
water



(Joins sheet 95)
(Joins sheet 102)
(Joins sheet 104)
(Joins sheet 112)
520 000 FEET
535 000 FEET
R O C H E S T E R
G A R D I N E R
Stony Kill
Sanders Kill
Peters Kill
Coxing Kill
water
N
1 Mile
5 000 Feet
Scale 1:15 840

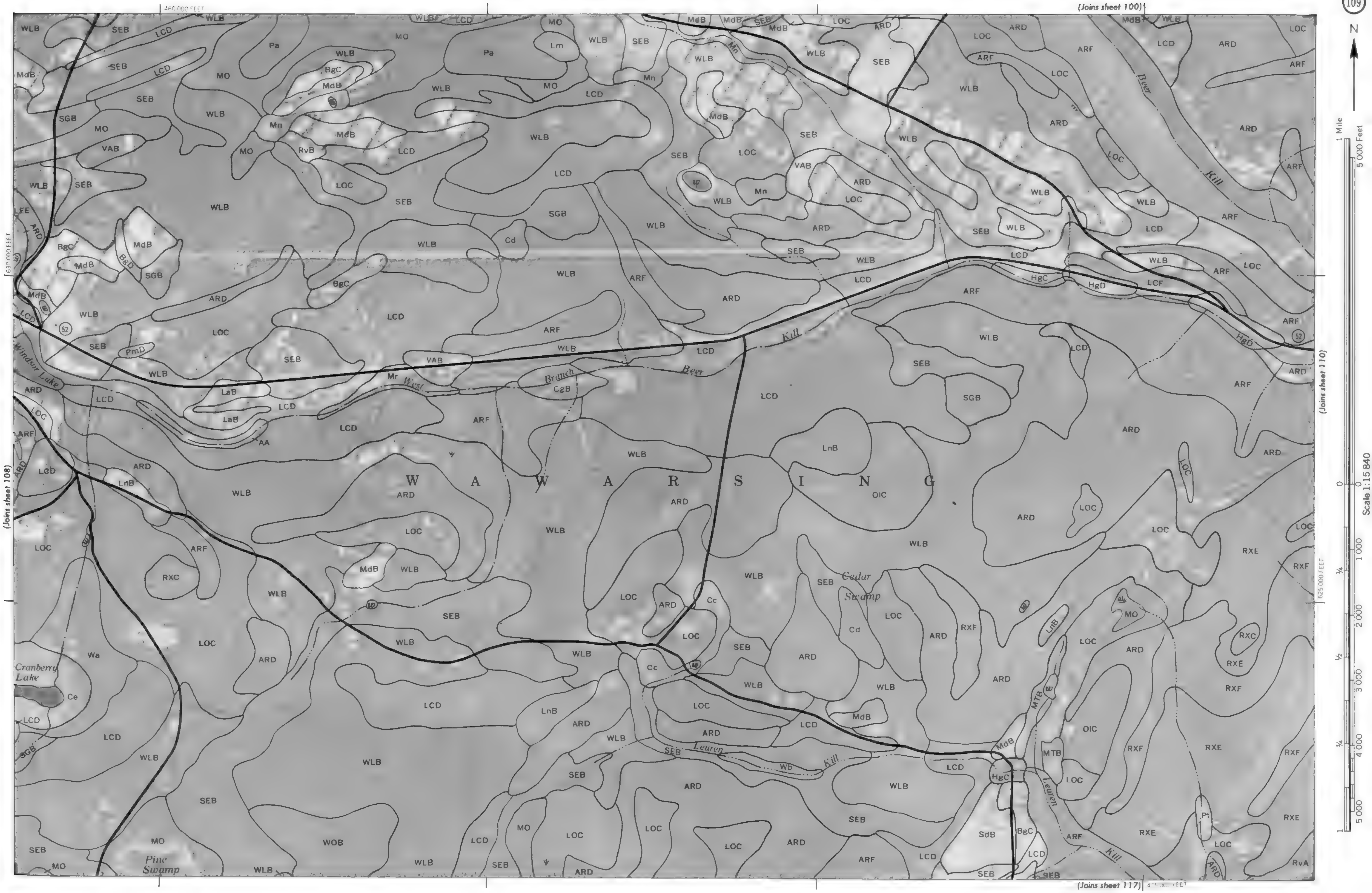

104
N
(Joins sheet 96)
(Joins sheet 103)
(Joins sheet 105)
(Joins sheet 113)
R O C H E S T E R
M A R B L E T O W N
N E W P A L T Z
G A R D I N E R
SHAWANGUNK MOUNTAINS
Mohonk Lake
Eagle Cliff
Duck Pond
Coxing Kill
Kleine Kill
Catskill Aqueduct
Scale 1:15 840
1 Mile
5 000 Feet
555 000 FEET
540 000 FEET
645 000 FEET
635 000 FEET
299

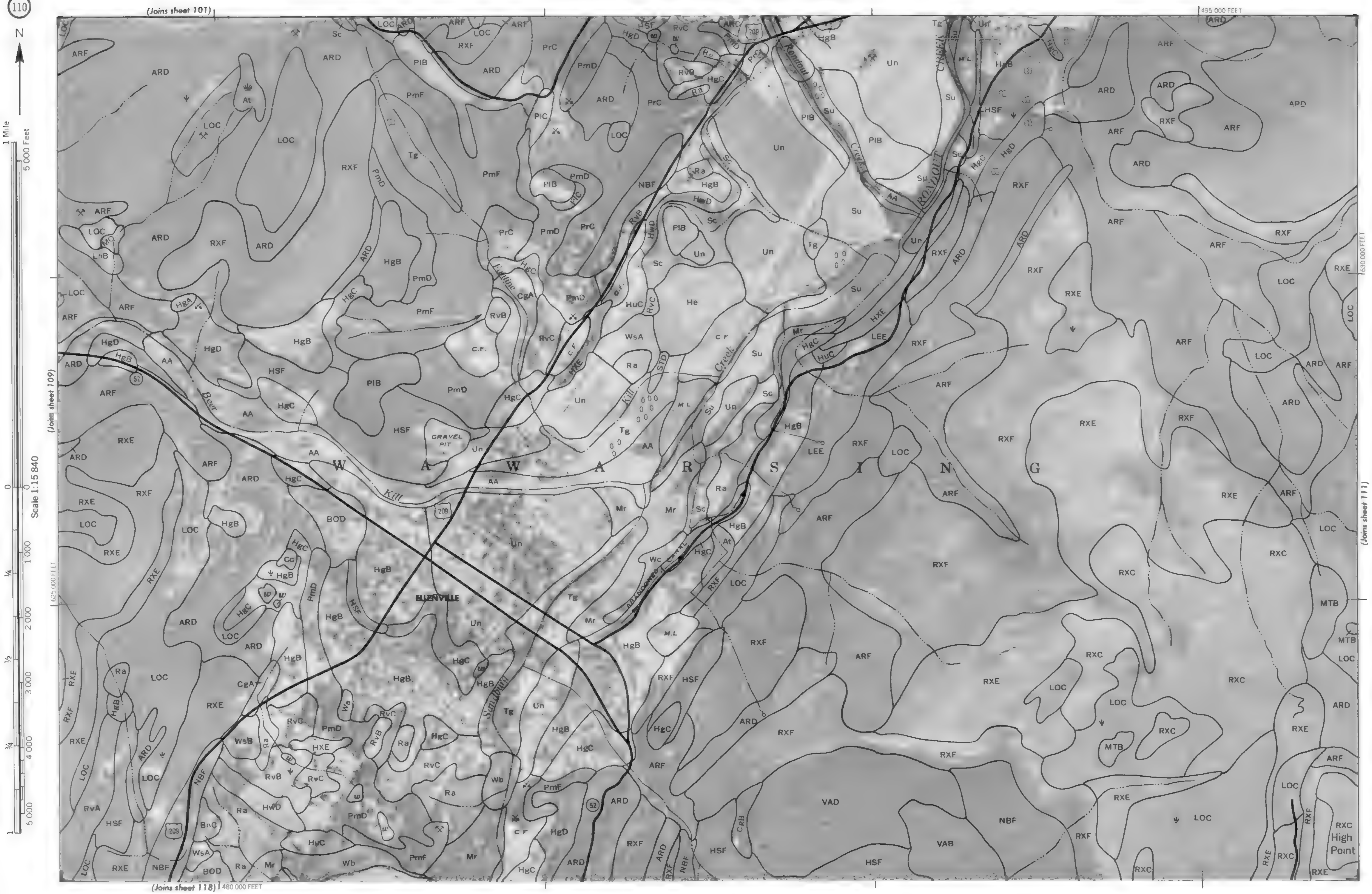

Springtown
NEW PALTZ
Puft Corners
WALLKILL RIVER
Catskill Aqueduct
Kleine Kill
CONRAIL
(Joins sheet 97)
(Joins sheet 104)
(Joins sheet 106)
(Joins sheet 114)
560 000 FEET
575 000 FEET
N
1 Mile
5 000 Feet
Scale 1:15 840

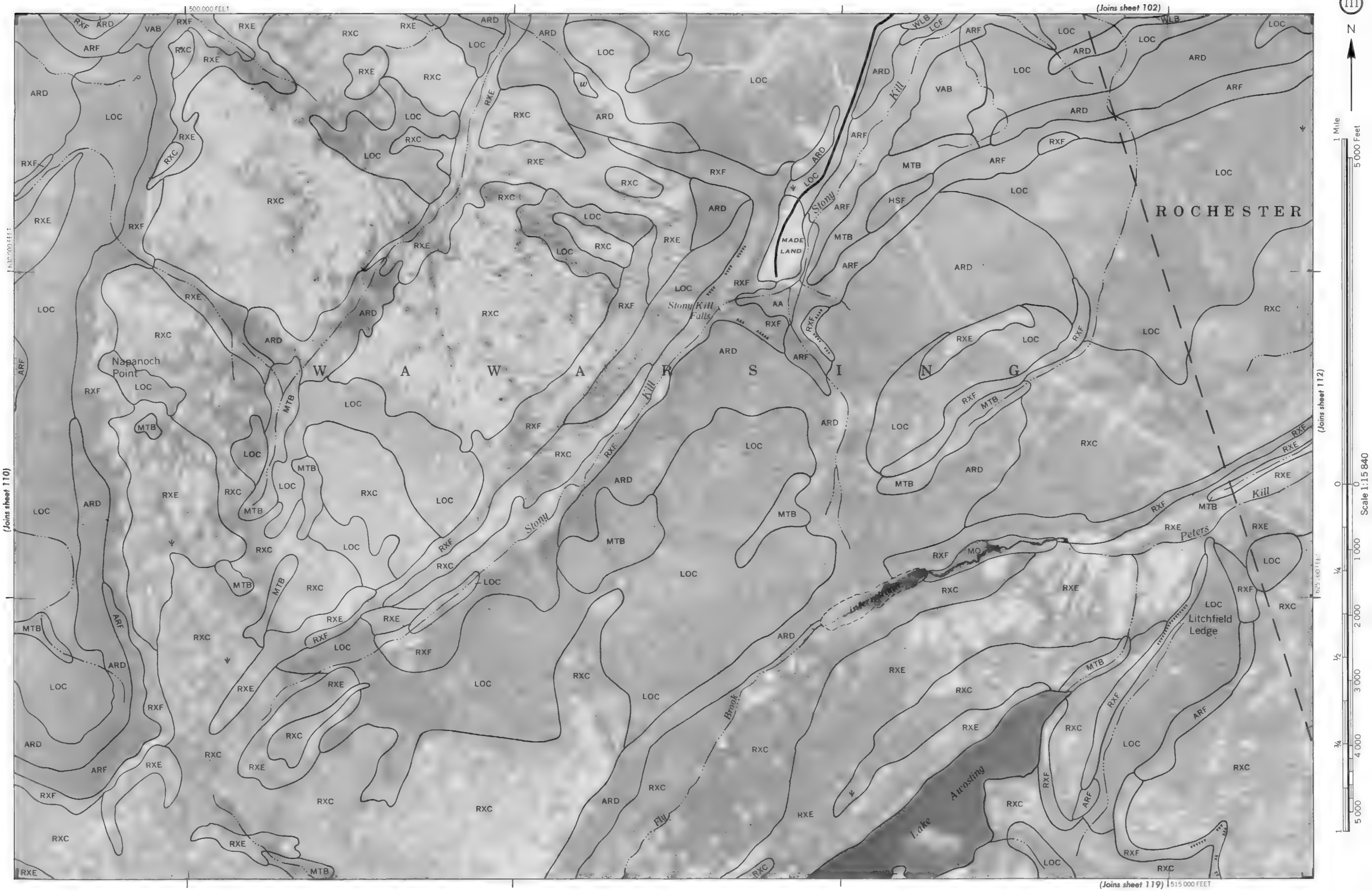

106
N
(Joins sheet 98)
(Joins sheet 105)
(Joins sheet 107)
(Joins sheet 115)
1 Mile
5 000 Feet
Scale 1:15 840
595 000 FEET
645 000 FEET
635 000 FEET
580 000 FEET
N E W P A L T Z
L L O Y D
Chodikee Lake
Lily Lake
Marx Pond
Swarte Kill
Black Creek
Elting Corners
GRAVEL PIT
MADE LAND
BORROW PIT
CUT AND FILL LAND


107
N
(Joins inset, sheet 90)
(Joins sheet 106)
(Joins sheet 116)
600 000 FEET
615 000 FEET
E S O P U S
L L O Y D
H U D S O N R I V E R
C R U M E L B O W
DUTCHESS COUNTY
CONRAIL
Intermittent
1 Mile
5 000 Feet
Scale 1:15 840

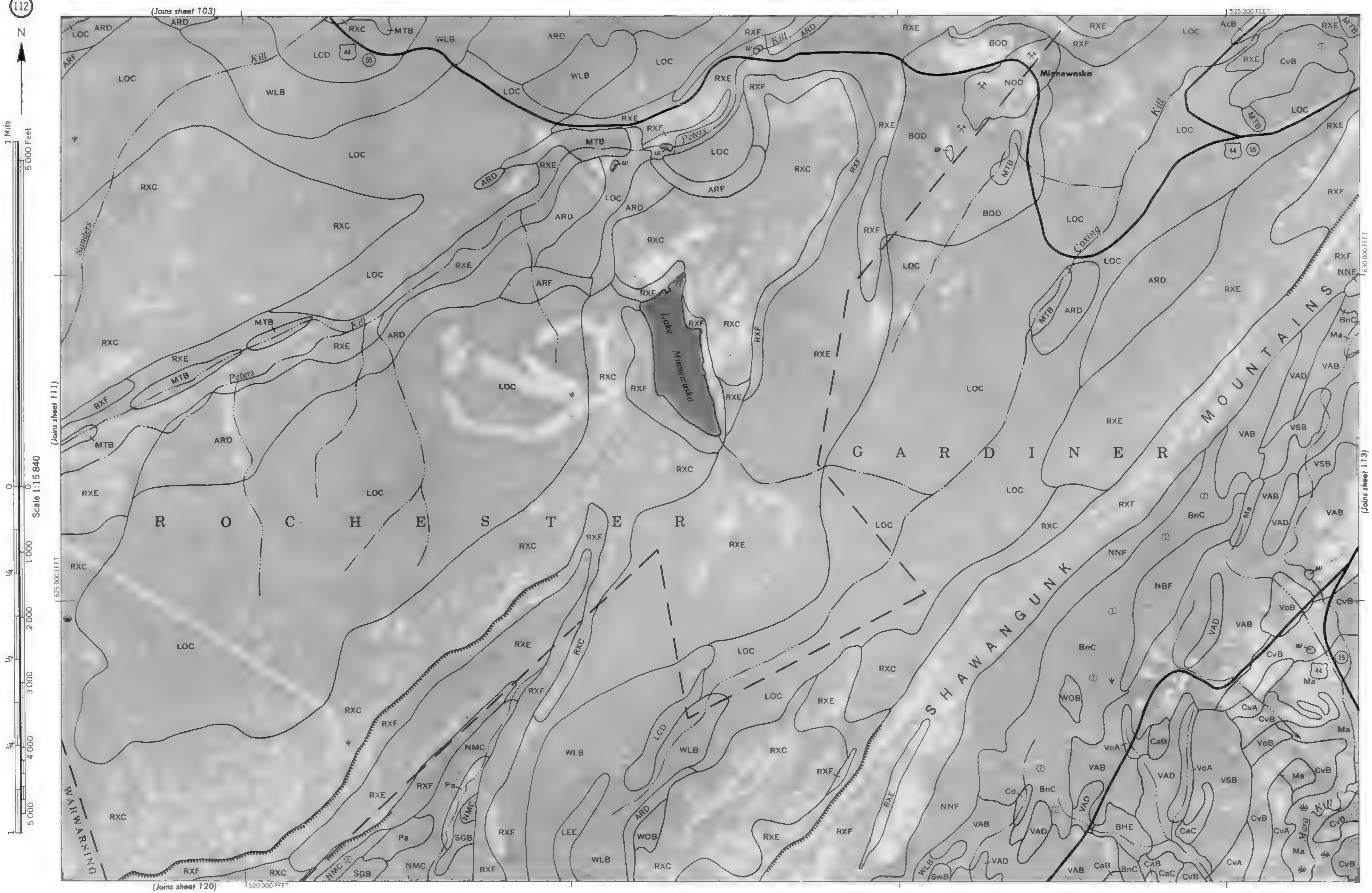

108
N
(Joins sheet 99)
(Joins inset, sheet 91)
(Joins sheet 109)
(Joins inset, sheet 124)
455 000 FEET
630 000 FEET
625 000 FEET
440 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
W A W A R S I N G
SULLIVAN COUNTY
Cranberry Lake
Brook
West Branch
Beer Kill
intermittent
water


(Joins sheet 100)
(Joins sheet 108)
(Joins sheet 110)
(Joins sheet 117)
460 000 FEET
630 000 FEET
625 000 FEET
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000
W A W A R S I N G
Windsor Lake
Cranberry Lake
Pine Swamp
Cedar Swamp
West Branch
Beer Kill
Leuren Kill
52
WLB
SEB
LCD
MO
Pa
Lm
MdB
BgC
Mn
VAB
SGB
RvB
LOC
ARD
ARF
SEB
Cd
LaB
LnB
CgB
PmD
AA
Mr
OIC
RXC
RXE
RXF
Cc
Wa
Ce
WOB
HgC
HgD
LCF
MTB
SdB
Wb
Pt
RvA
LEE

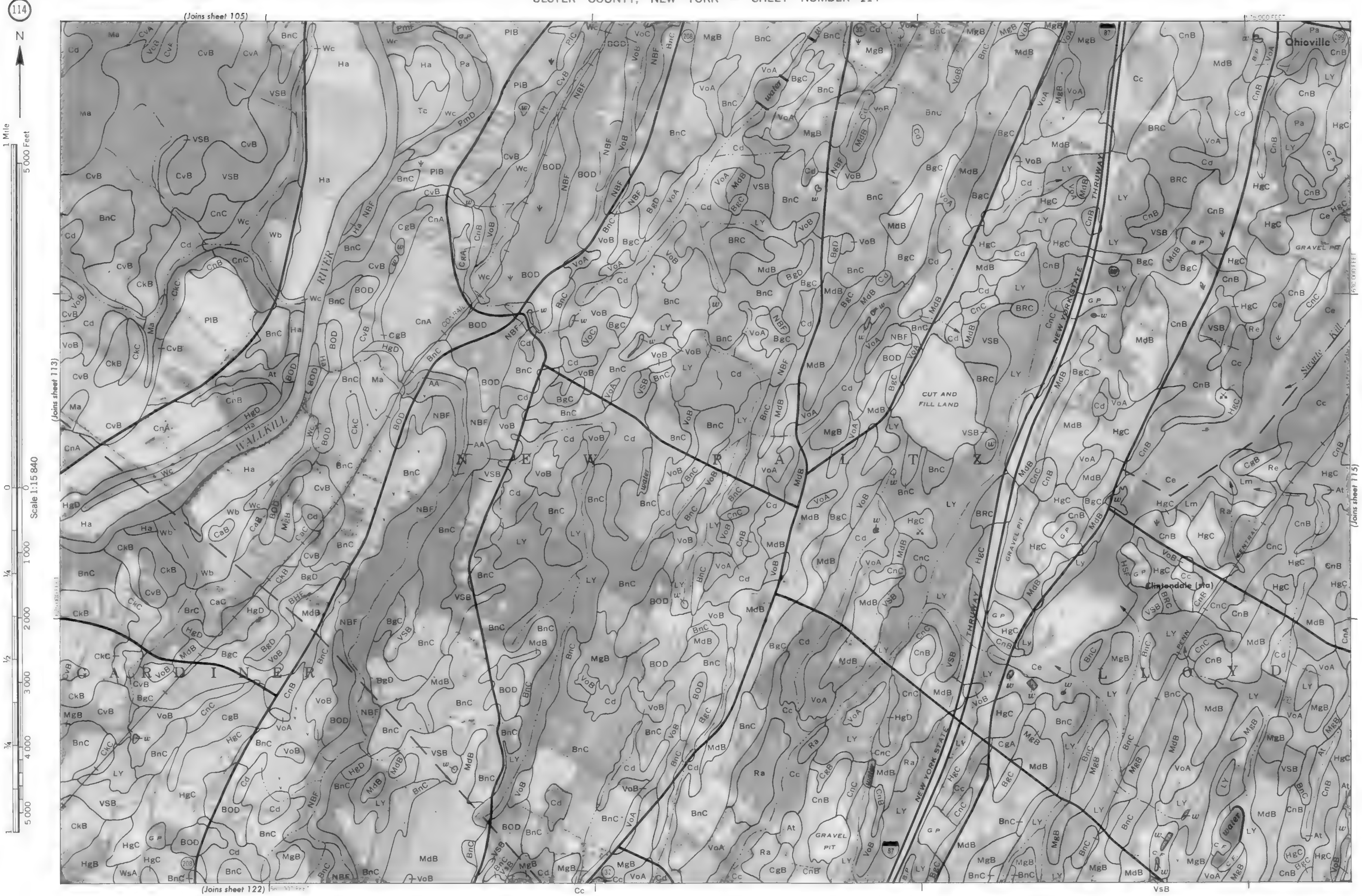

110
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 101)
(Joins sheet 109)
(Joins sheet 111)
(Joins sheet 118)
495 000 FEET
480 000 FEET
630 000 FEET
625 000 FEET
W A W A R S I N G
ELLENVILLE
Beer Kill
Fantine Kill
Sandburg
Rondout Creek
RONDOUT
Chestnut Creek
ABANDONED CANAL
GRAVEL PIT
High Point
209
52

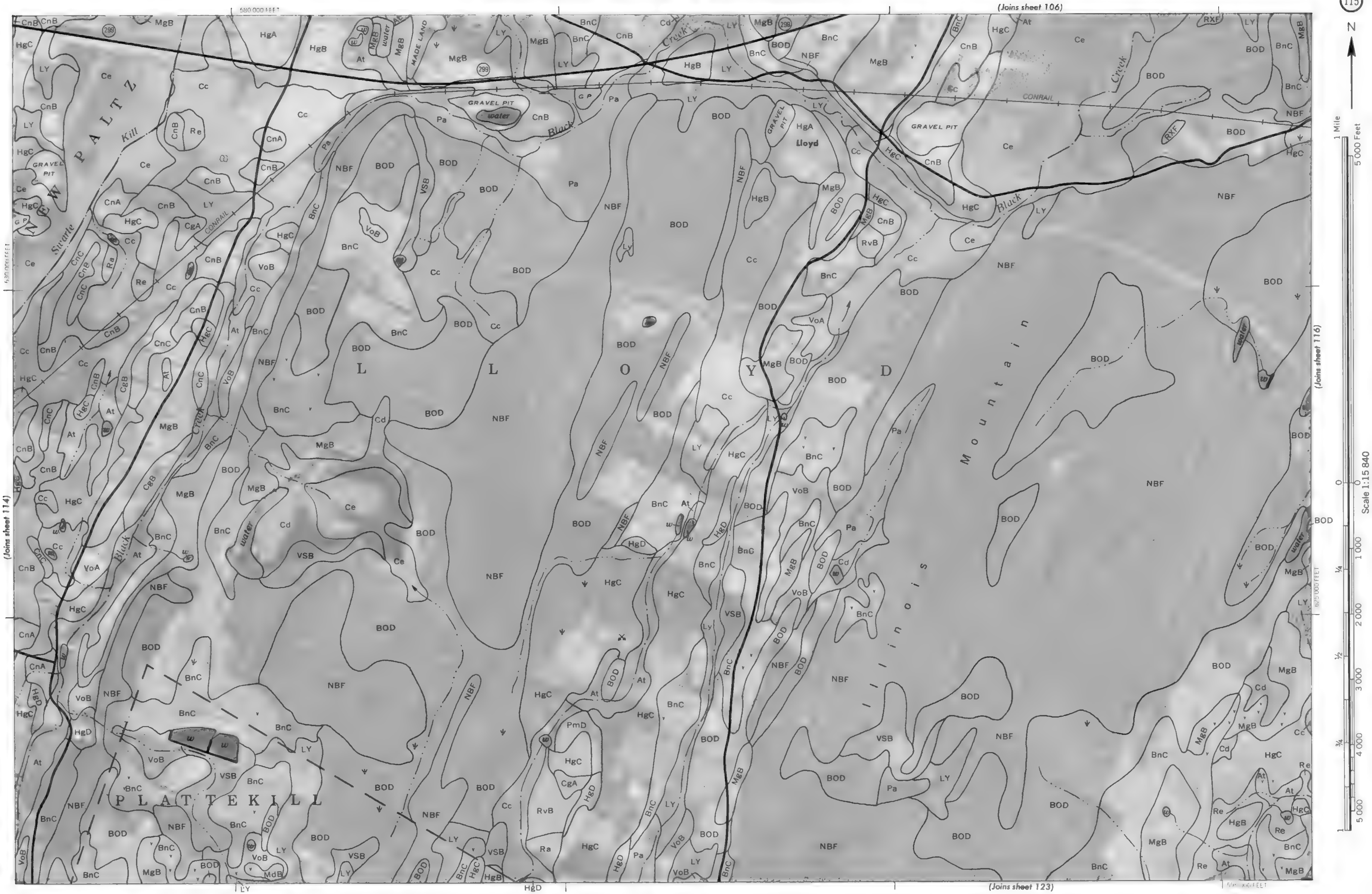

(Joins sheet 102)
(Joins sheet 110)
(Joins sheet 112)
(Joins sheet 119)
500 000 FEET
515 000 FEET
ROCHESTER
W A W A R S I N G
Napanoch Point
Stony Kill Falls
MADE LAND
Stony Kill
Peters Kill
Fly Brook
Lake Awosting
Litchfield Ledge
N
Scale 1:15 840
1 Mile
5 000 Feet

112

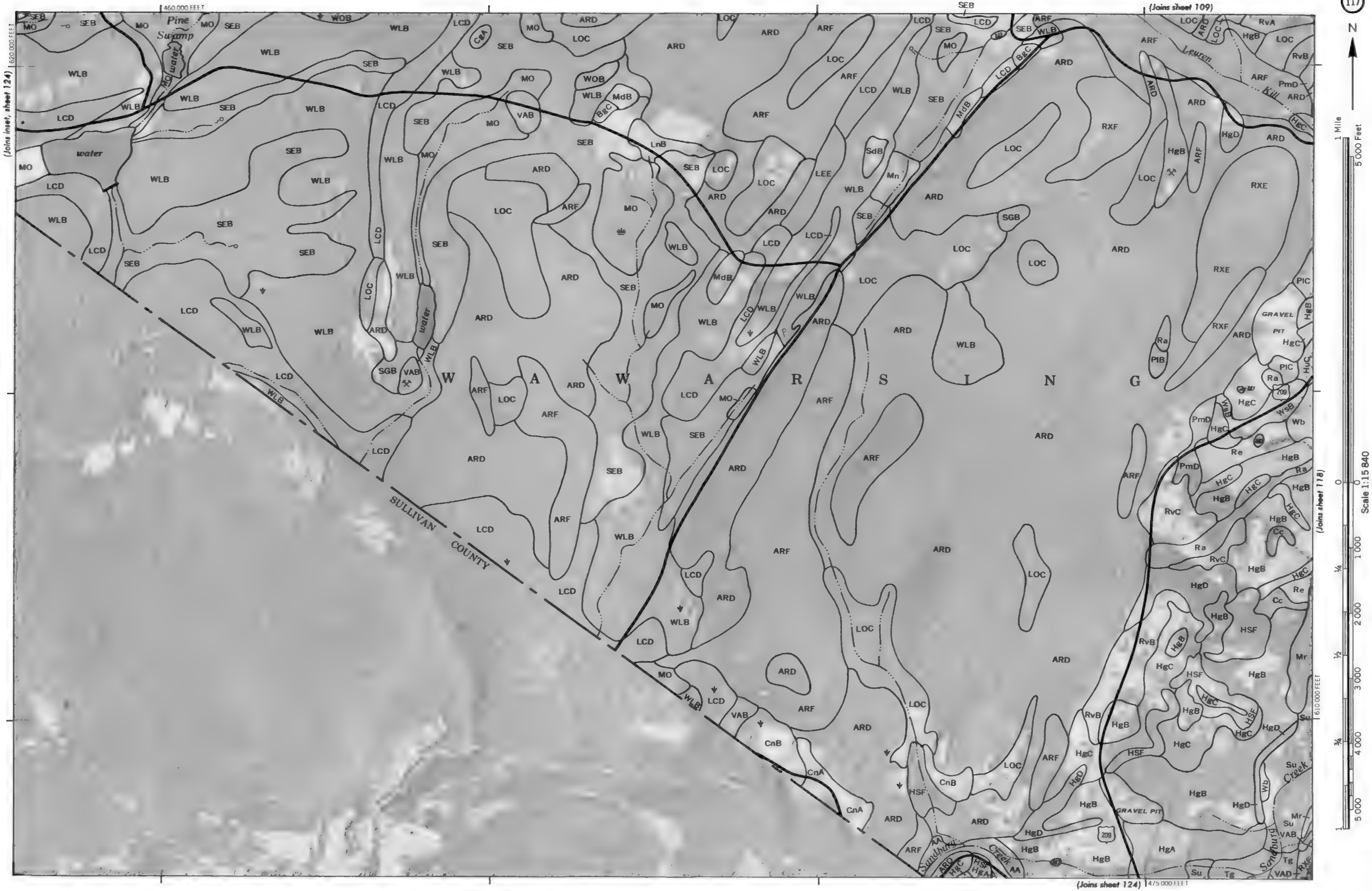

N
(Joins sheet 103)
(Joins sheet 111)
(Joins sheet 113)
(Joins sheet 120)
535 000 FEET
520 000 FEET
630 000 FEET
625 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
ROCHESTER
GARDINER
SHAWANGUNK MOUNTAINS
WARWARSING
Lake Minnewaska
Minnewaska
Peters Kill
Sanders Kill
Coxing Kill
Mara Kill

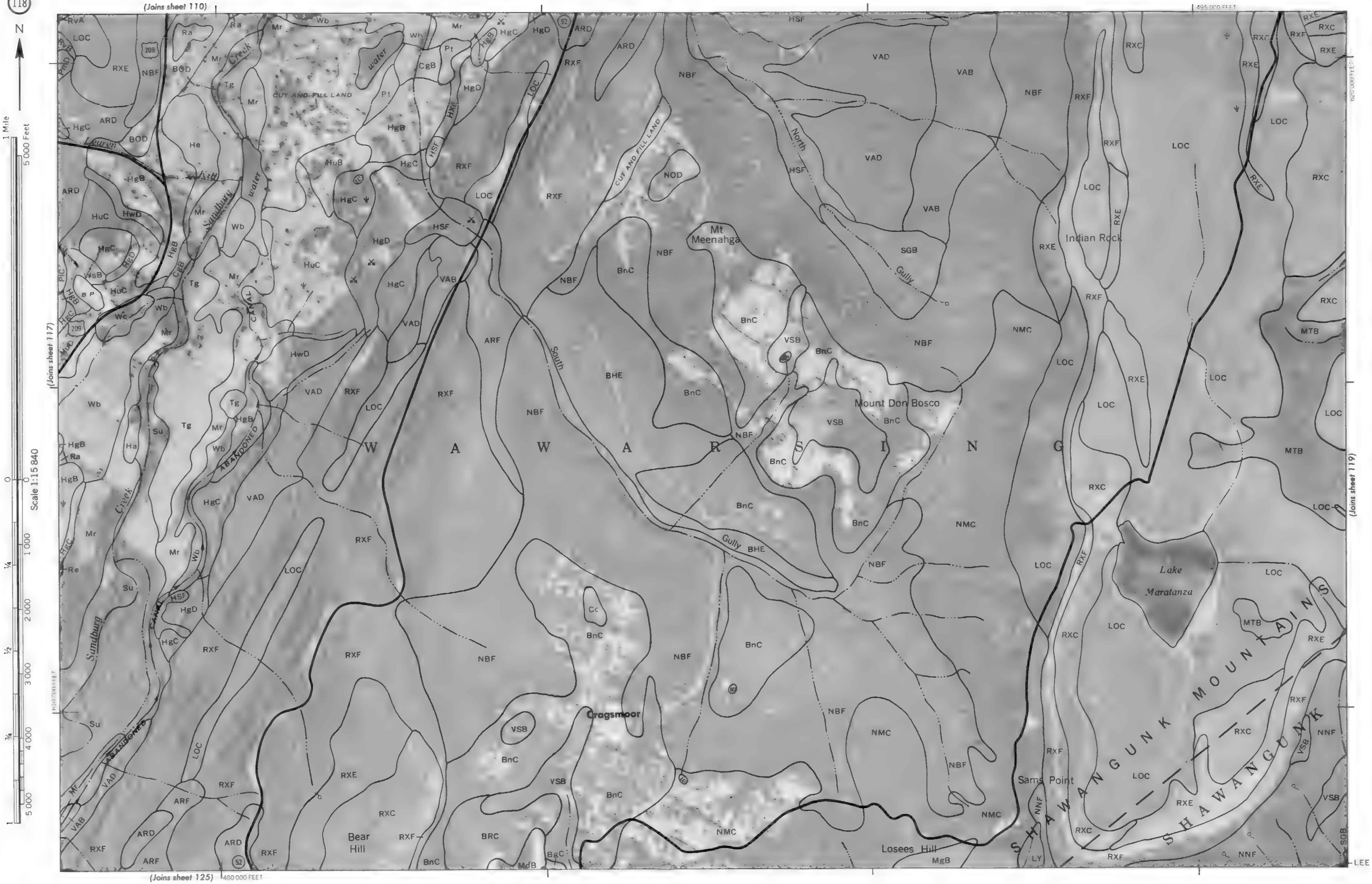

113
N
(Joins sheet 104)
(Joins sheet 112)
(Joins sheet 114)
(Joins sheet 121)
540 000 FEET
555 000 FEET
630 000 FEET
625 000 FEET
G A R D I N E R
N E W P A L T Z
WALLKILL
RIVER
Libertyville
Kill
Mara
CONRAIL
MADE LAND
1 Mile
5 000 Feet
Scale 1:15 840

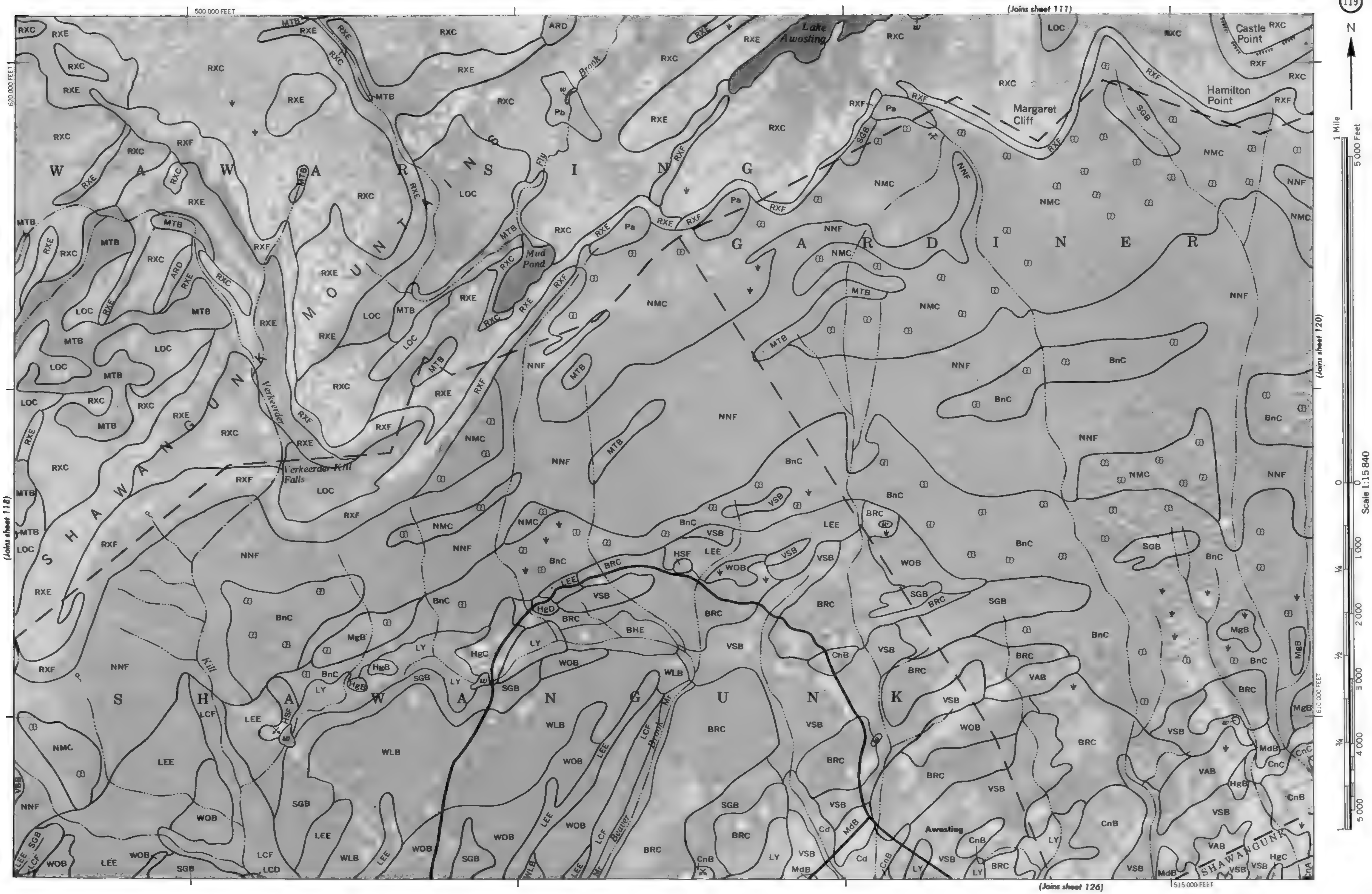

114
N
(Joins sheet 105)
(Joins sheet 113)
(Joins sheet 115)
(Joins sheet 122)
Scale 1:15 840
1 Mile
5 000 Feet
NEW PALTZ
GARDINER
LLOYD
WALLKILL RIVER
Swarte Kill
Ohioville
Clintondale (sta)
CUT AND FILL LAND
NEW YORK STATE THRUWAY
GRAVEL PIT
CONRAIL
PENN CENTRAL
water

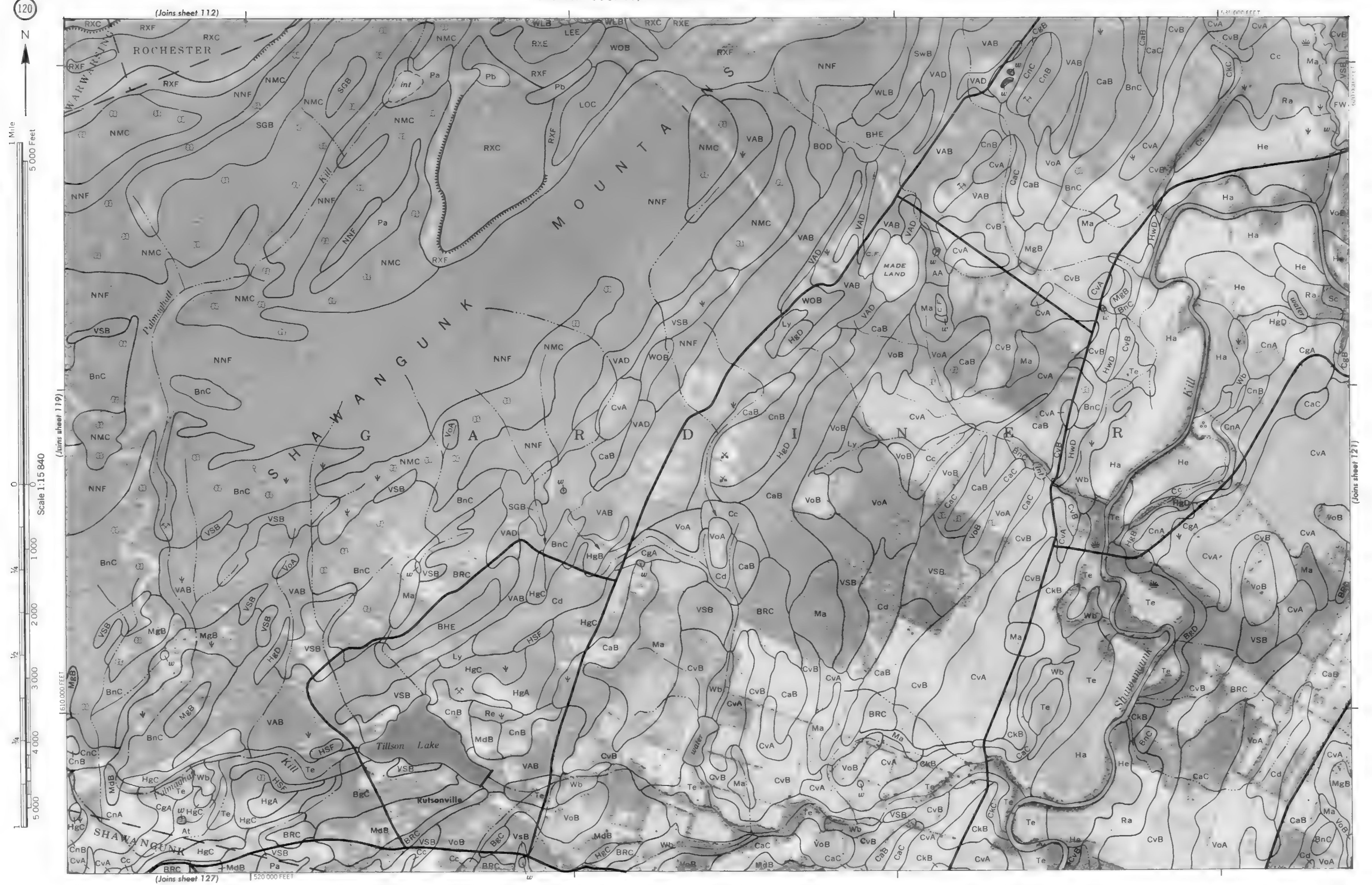

115
(Joins sheet 106)
(Joins sheet 114)
(Joins sheet 116)
(Joins sheet 123)
580 000 FEET
625 000 FEET
NEW PALTZ
LLOYD
PLATTEKILL
Lloyd
Illinois Mountain
Swarte Kill
Black Creek
CONRAIL
GRAVEL PIT
water
MADE LAND
299
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1
0
1000
2000
3000
4000
5000


116
N
(Joins sheet 107)
(Joins sheet 115)
(Joins inset, sheet 131)
615 000 FEET
630 000 FEET
600 000 FEET
625 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
0
1000
2000
3000
4000
5000
¼
½
¾
1
Highland
L L O Y D
HUDSON RIVER
DUTCHESS COUNTY
CONRAIL
water
BOD
NBF
BnC
HgC
LY
BgC
BgD
VoA
VoB
VSB
MgB
MdB
Pa
PmF
Cd
Cc
CF
ML
AA
At
BHE
Ra
Re
HSF
CnA
Twaalfskill
Creek
9W
299
55
44

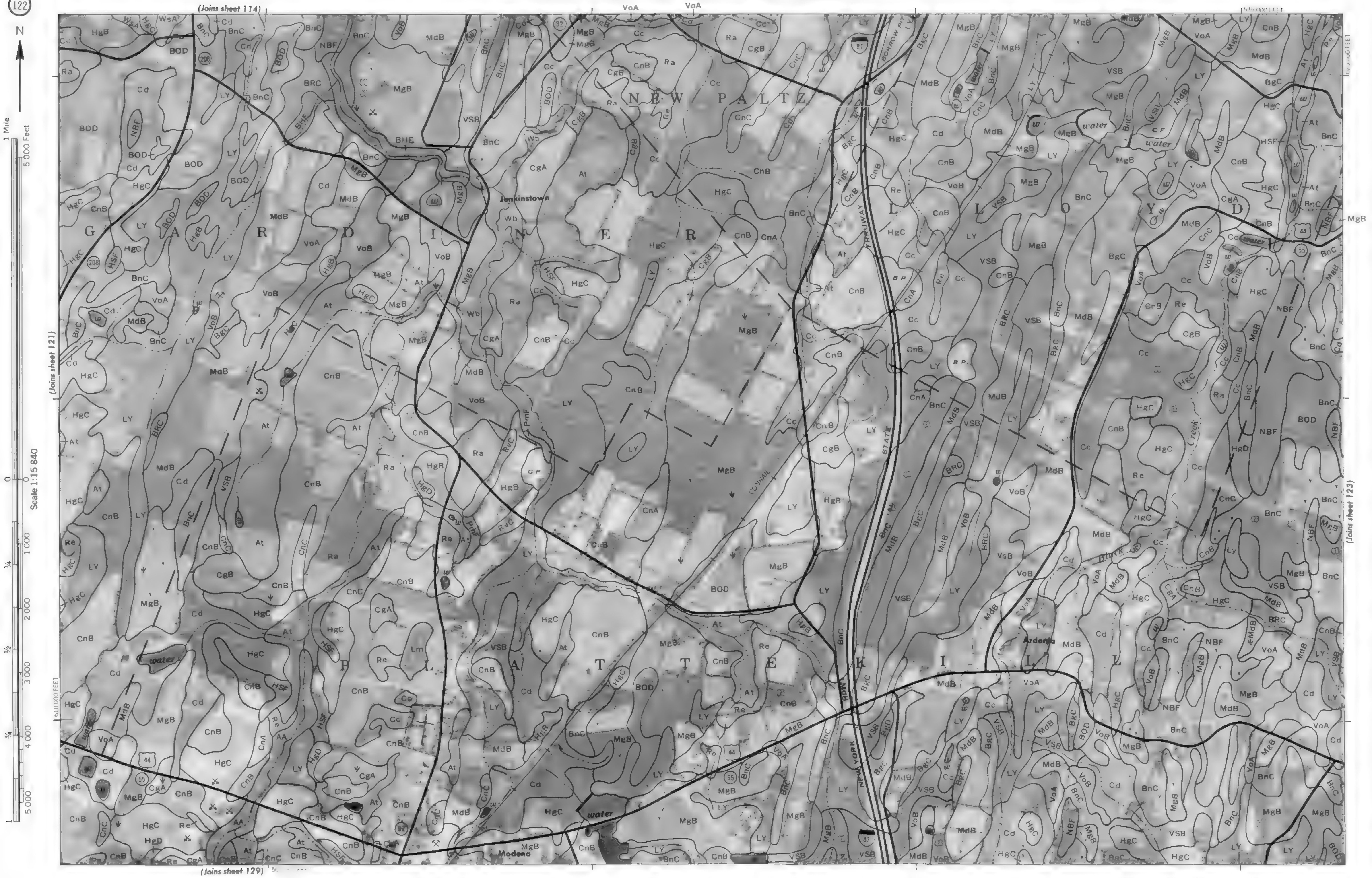

(Joins sheet 109)
(Joins sheet 118)
(Joins sheet 124)
(Joins inset, sheet 124)
460 000 FEET
475 000 FEET
620 000 FEET
610 000 FEET
N
1 Mile
5 000 Feet
Scale 1:15 840
Pine Swamp
water
SULLIVAN COUNTY
W A W A R S I N G
Leuren Kill
Sandburg Creek
GRAVEL PIT
209
WLB
SEB
MO
LCD
ARD
ARF
LOC
RXF
RXE
HgB
HgC
HgD
HSF
CnB
CnA
VAB


N
(Joins sheet 110)
(Joins sheet 117)
(Joins sheet 119)
(Joins sheet 125)
480 000 FEET
495 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1
W A W A R S I N G
SHAWANGUNK MOUNTAINS
SHAWANGUNK
Mt Meenahga
Mount Don Bosco
Indian Rock
Lake Maratanza
Cragsmoor
Sams Point
Bear Hill
Losees Hill
CUT AND FILL LAND
Sandburg Creek
Lauren Kill
ABANDONED CANAL
water
North Gully
South Gully
209
52
LEE


119
N
(Joins sheet 111)
(Joins sheet 118)
(Joins sheet 120)
(Joins sheet 126)
500 000 FEET
620 000 FEET
610 000 FEET
515 000 FEET
Lake Awosting
Castle Point
Hamilton Point
Margaret Cliff
Mud Pond
Verkeerder Kill Falls
Verkeerder
Kill
Fly
Brook
Beaver
Awosting
SHAWANGUNK
SHAWANGUNK MOUNTAINS
GARDINER
SHAWANGUNK
1 Mile
5 000 Feet
Scale 1:15 840

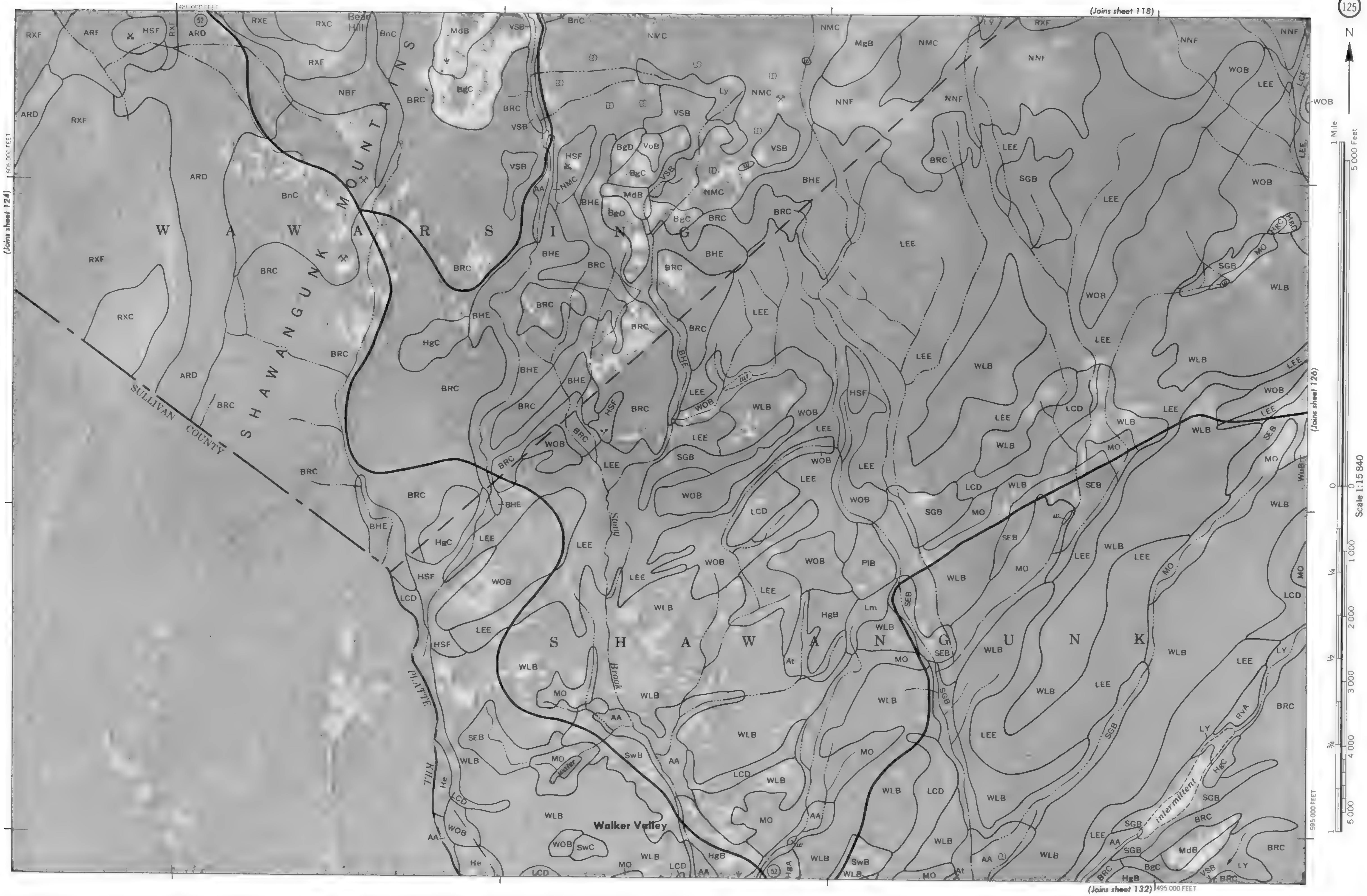

120
(Joins sheet 112)
(Joins sheet 119)
(Joins sheet 121)
(Joins sheet 127)
N
Scale 1:15 840
1 Mile
5 000 Feet
610 000 FEET
520 000 FEET
ROCHESTER
SHAWANGUNK MOUNTAINS
SHAWANGUNK
RONDOUT
Palmaghatt Kill
Shawangunk Kill
Tillson Lake
Rutsonville
MADE LAND
water

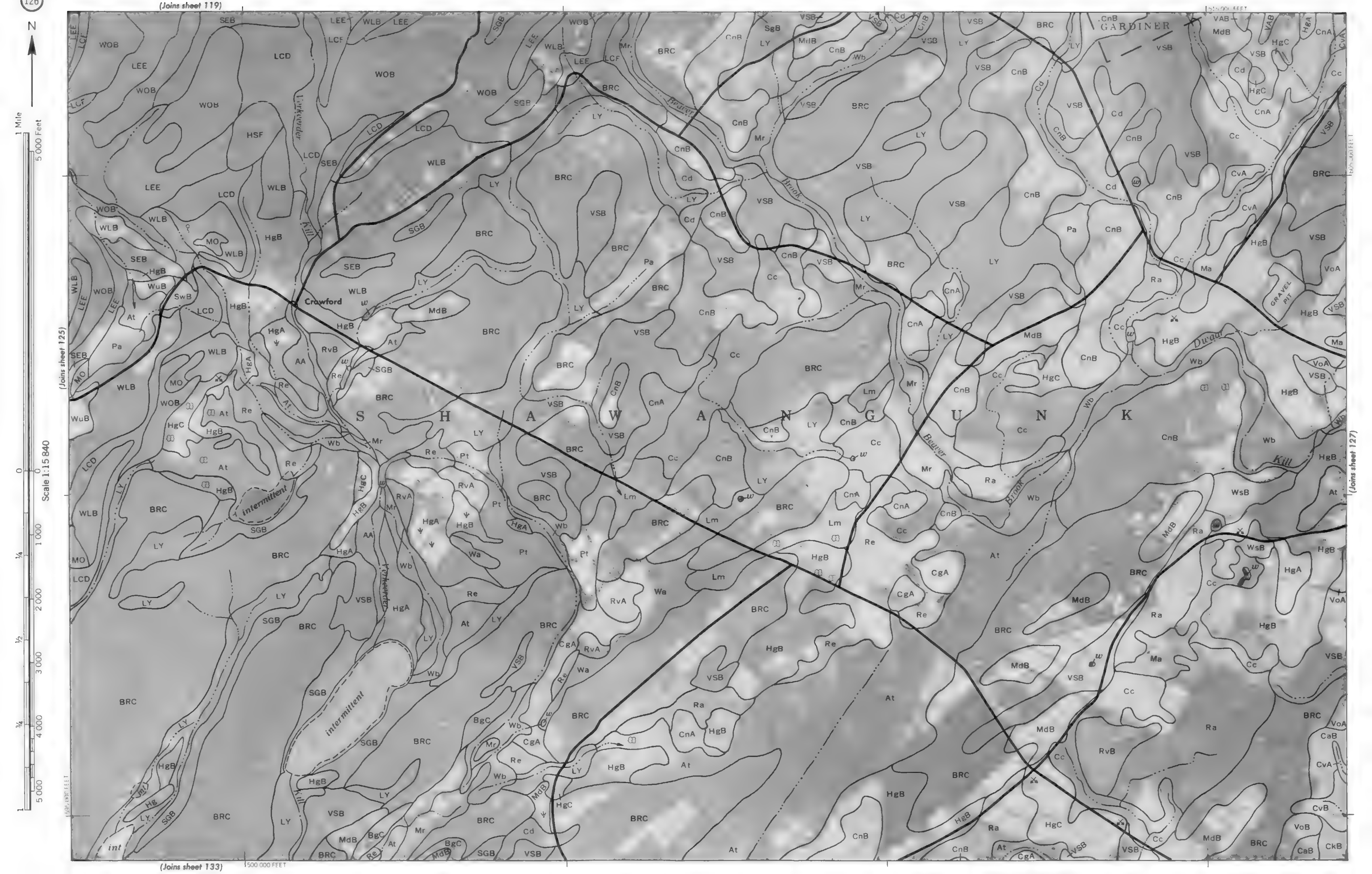
121
N
(Joins sheet 113)
(Joins sheet 120)
(Joins sheet 122)
(Joins sheet 128)
540 000 FEET
555 000 FEET
620 000 FEET
610 000 FEET
GARDINER
Gardiner
Tuthill
Ganahgote
Ireland Corners
WALLKILL RIVER
Shawangunk Kill
Shawangunk
Kill
Aqueduct
Catskill
PLATTEKILL
CONRAIL
1 Mile
5 000 Feet
Scale 1:15 840


122
N
(Joins sheet 114)
(Joins sheet 121)
(Joins sheet 123)
(Joins sheet 129)
NEW PALTZ
GARDINER
LLOYD
PLATTEKILL
Jenkinstown
Ardonia
Modena
THRUWAY
NEW YORK STATE
BORROW PIT
Black Creek
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000
610 000 FEET


123
(Joins sheet 115)
(Joins sheet 122)
(Joins inset sheet 131)
(Joins sheet 130)
LLOYD
PLATTEKILL
MARLBOROUGH
Illinois Mountain
MARLBORO MOUNTAIN
Clintondale
Baileys Gap
Tuckers Corner
GRAVEL PIT
N
Scale 1:15 840
1 Mile
5 000 Feet


N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
¼
2 000
½
3 000
¾
4 000
5 000
1
(Joins sheet 117)
475 000 FEET
605 000 FEET
(Joins sheet 125)
595 000 FEET
460 000 FEET
W A W A R S I N G
Sandburg
Creek
Kill
Homowack
Spring Glen
SULLIVAN
COUNTY
ARD
AA
HgC
HSF
Su
HgB
HgA
Tg
RXF
Ra
VAD
CnC
CnB
RXF
(Joins sheet 108)
457 000 FEET
620 000 FEET
617 000 FEET
453 000 FEET
(Joins sheet 117)
SGB
LCD
WLB
MO
SEB
water
LOC
CUT AND FILL LAND
WeB
LCF
3000 AND 4000-FOOT GRID TICKS

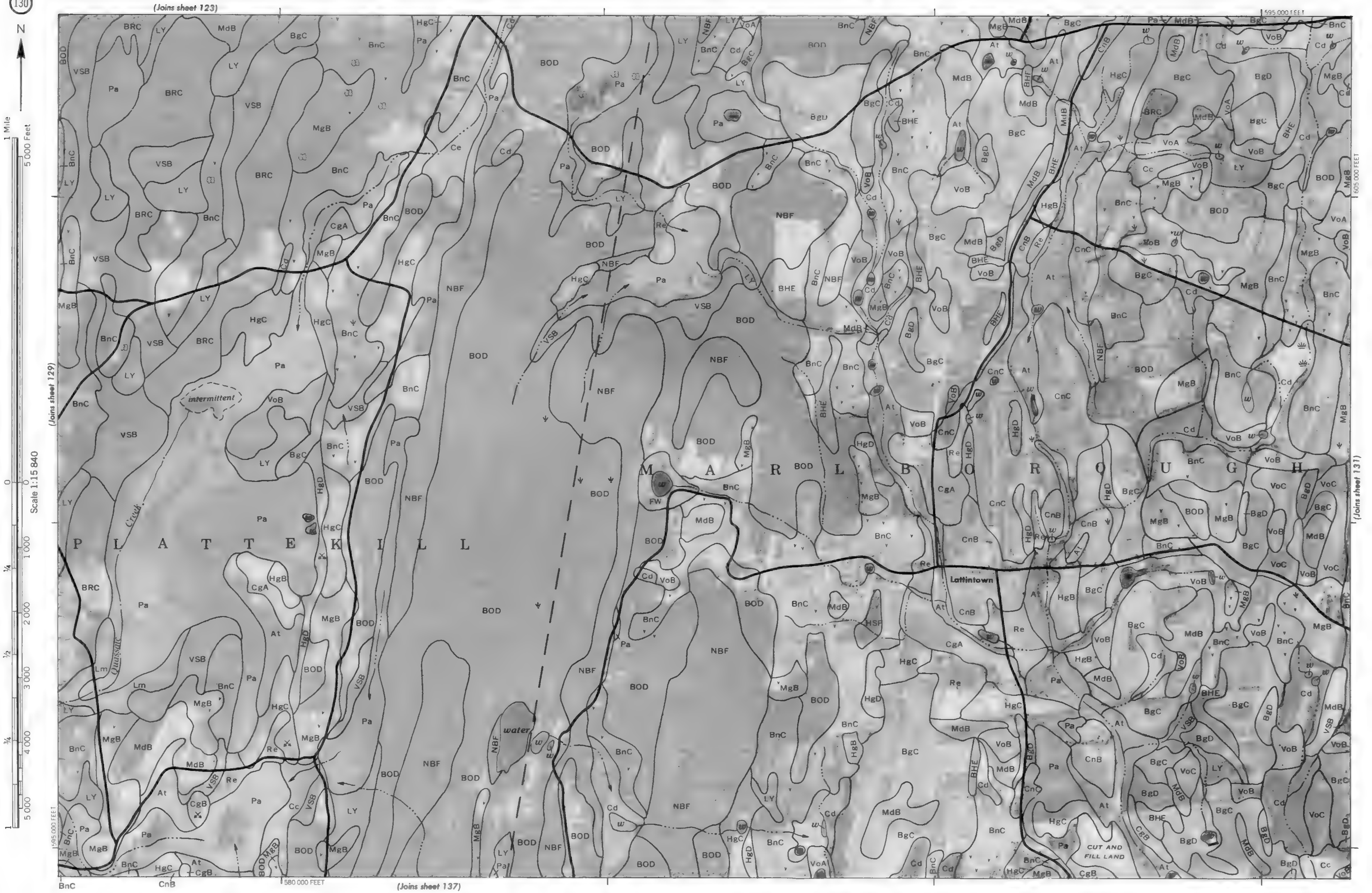

125
(Joins sheet 118)
(Joins sheet 124)
(Joins sheet 126)
(Joins sheet 132)
N
1 Mile
5 000 Feet
Scale 1:15 840
SHAWANGUNK MOUNTAINS
WAWARSING
SHAWANGUNK
SULLIVAN COUNTY
Walker Valley
Bear Hill
PLATTE KILL
Shaw Brook
intermittent
water
481 000 FEET
595 000 FEET
495 000 FEET
604 000 FEET
52


N
(Joins sheet 119)
(Joins sheet 125)
(Joins sheet 127)
(Joins sheet 133)
Crawford
GARDINER
S H A W A N G U N K
Beaver Brook
Dwaar Kill
Vly Kill
intermittent
GRAVEL PIT
1 Mile
5 000 Feet
Scale 1:15 840
500 000 FEET

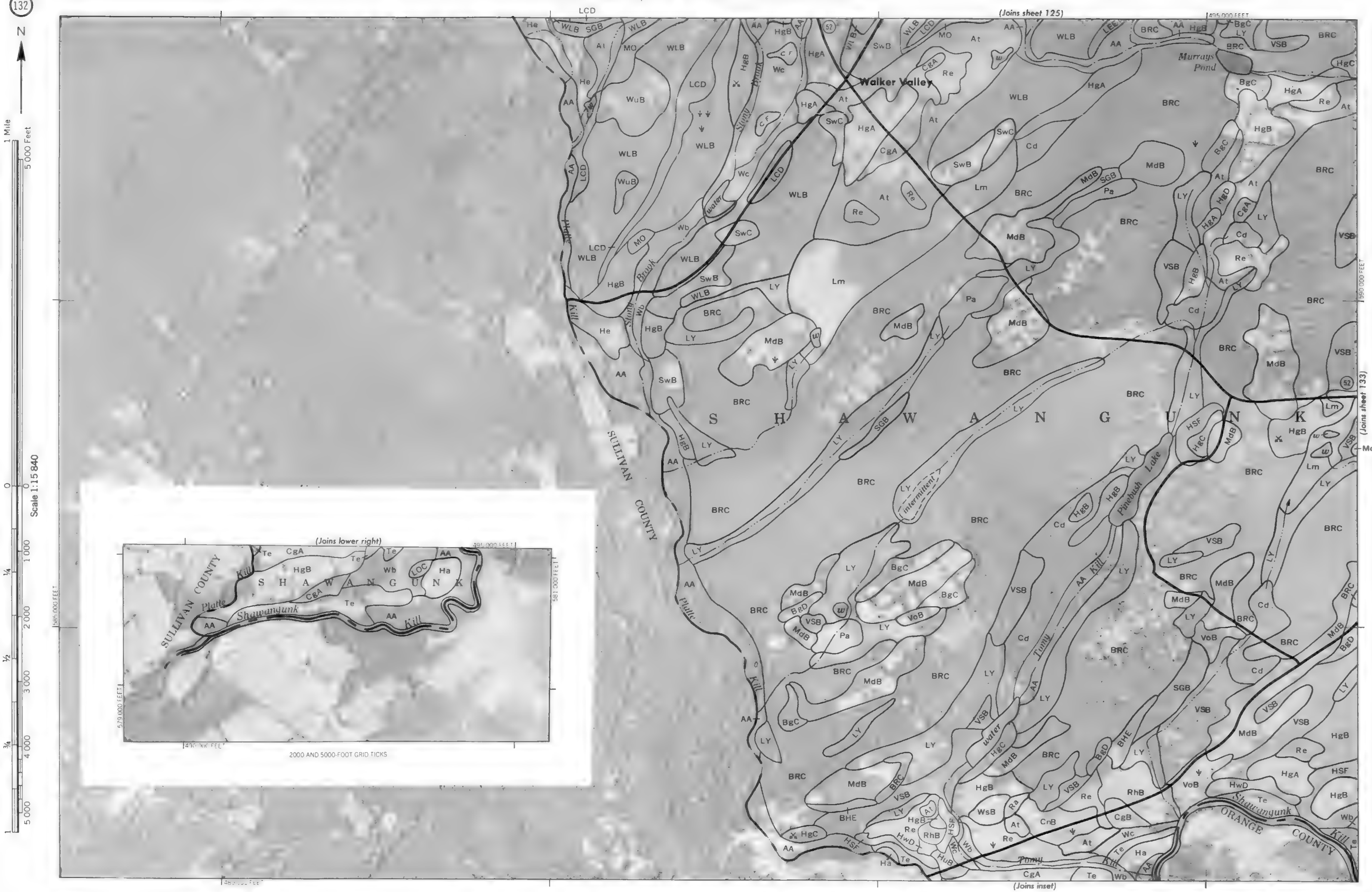

(Joins sheet 120)
(Joins sheet 126)
(Joins sheet 128)
(Joins sheet 134)
520 000 FEET
535 000 FEET
G A R D I N E R
S H A W A N G U N K
Bruynswick
BRUYNSWICK CEMETERY
Dwaarkill
Shawangunk
Kill
CUT AND FILL LAND
U S MILITARY RESERVATION
ORANGE COUNTY
N
1 Mile
5 000 Feet
Scale 1:15 840


128
N
(Joins sheet 121)
(Joins sheet 127)
(Joins sheet 129)
(Joins sheet 135)
1 Mile
5 000 Feet
Scale 1:15 840
G A R D I N E R
S H A W A N G U N K
P L A T T E K I L L
WALLKILL RIVER
CONRAIL
Catskill Aqueduct
Galeville
Newhurley
MADE LAND
water
208


(Joins sheet 1▮2)
(Joins sheet 128)
(Joins sheet 130)
(Joins sheet 136)
560 000 FEET
605 000 FEET
595 000 FEET
575 000 FEET
Modena
Modena Gardens
Sylva
Lake Sunset
P L A T T E K I L L
CONRAIL
THRUWAY
NEW YORK STATE
Buchfield Creek
Quassaic Creek
CUT AND FILL LAND
GRAVEL PIT
water
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾


(Joins sheet 123)
(Joins sheet 129)
(Joins sheet 131)
(Joins sheet 137)
N
1 Mile
5 000 Feet
Scale 1:15 840
595 000 FEET
605 000 FEET
580 000 FEET
P L A T T E K I L L
M A R L B O R O U G H
Lattintown
intermittent
water
Quassaic Creek
CUT AND FILL LAND


131
(Joins inset)
(Joins sheet 116)
(Joins sheet 130)
(Joins sheet 138)
(Joins upper left)
MARLBOROUGH
LLOYD
HUDSON RIVER
DUTCHESS COUNTY
Milton
Oakes
Blue Point
MID HUDSON BRIDGE
MADE LAND
GRAVEL PIT
CONRAIL
Scale 1:15 840
1 Mile
5 000 Feet


132
N
(Joins sheet 125)
Walker Valley
Murrays Pond
Stony Brook
Platte Kill
S H A W A N G U N K
SULLIVAN COUNTY
Pinebush Lake
Tuny Kill
Shawangunk Kill
ORANGE COUNTY
(Joins sheet 133)
(Joins inset)
(Joins lower right)
2000 AND 5000-FOOT GRID TICKS
Scale 1:15 840
1 Mile
5 000 Feet


133
N
(Joins sheet 126)
(Joins sheet 132)
(Joins sheet 134)
500 000 FEET
590 000 FEET
585 000 FEET
515 000 FEET
SHAWANGUNK
Shawangunk Kill
Ulsterville
Red Mills
ORANGE COUNTY
water
int
534 000 FEET
(Joins sheet 134)
SHAWANGUNK
ORANGE COUNTY
(Joins sheet 139)
581 000 FEET
579 000 FEET
536 000 FEET
2000 FOOT GRID TICKS
1 Mile
5 000 Feet
Scale 1:15 840
BRC
VSB
HgB
HgC
MdB
Re
Te
Wb
At

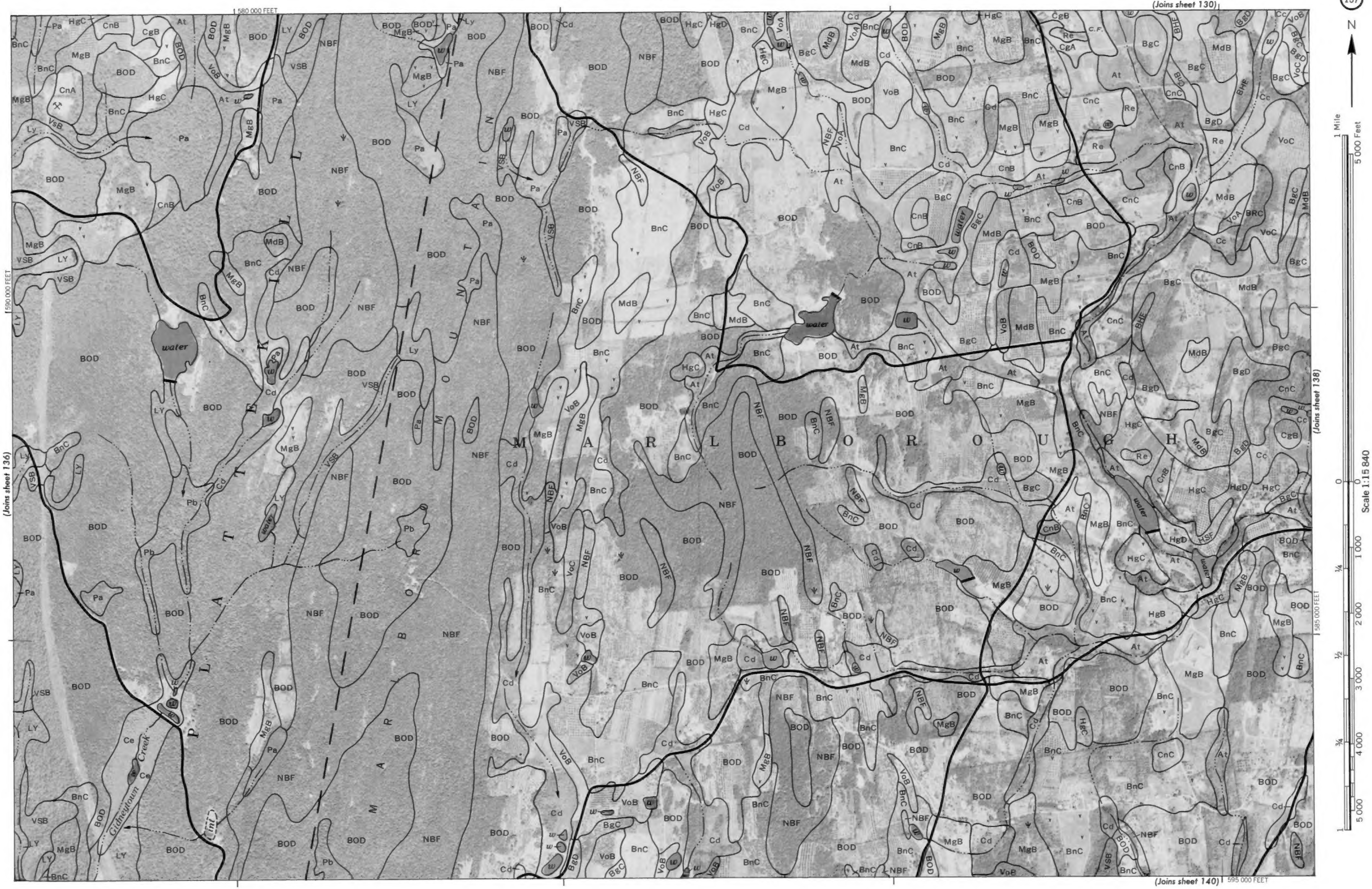
ULSTER COUNTY, NEW YORK — SHEET NUMBER 134

N

1 Mile
5 000 Feet
Scale 1:15 840

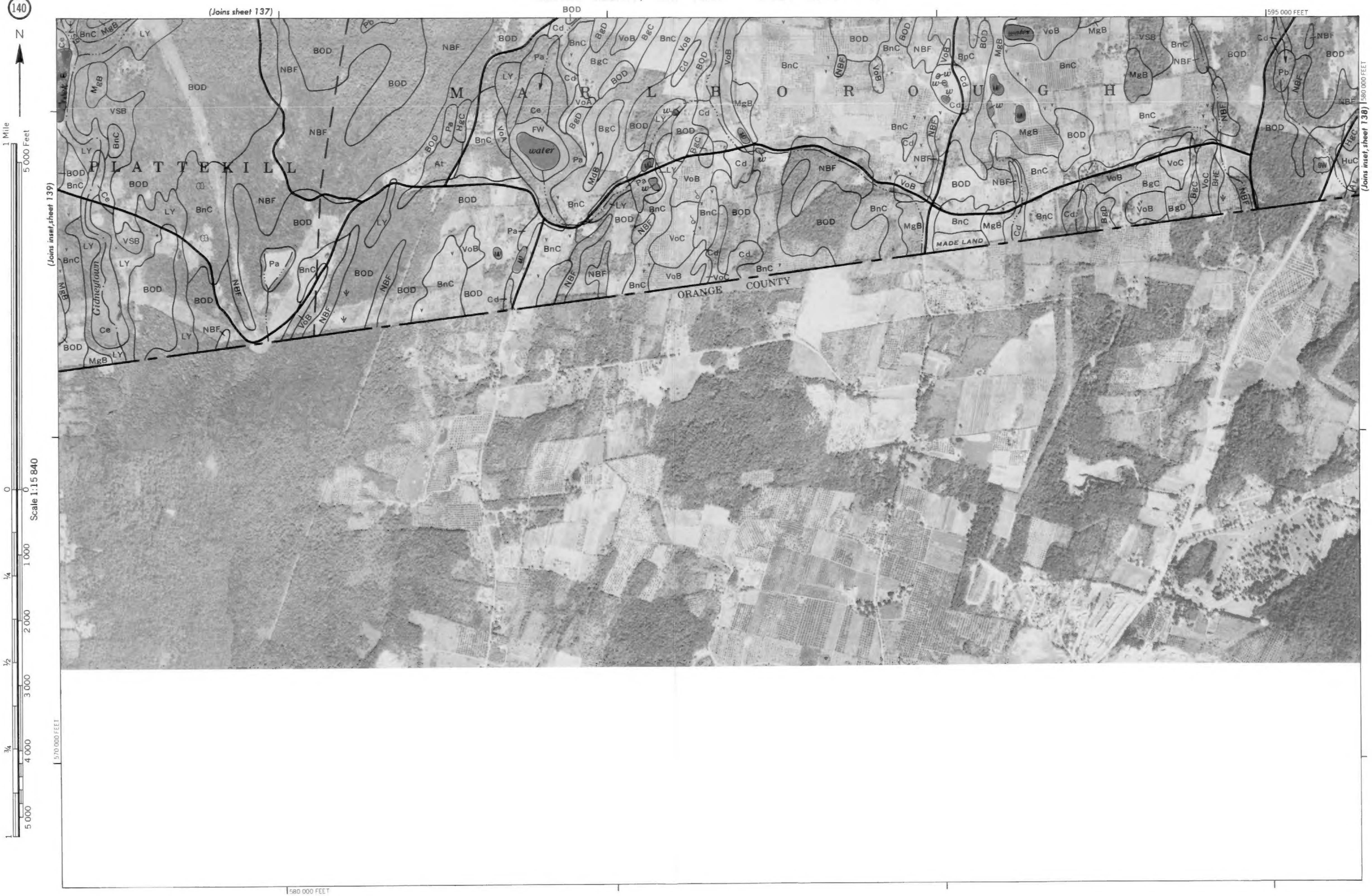

135
N
(Joins sheet 128)
(Joins sheet 134)
(Joins sheet 136)
(Joins sheet 139)
540 000 FEET
555 000 FEET
GRAVEL PIT
MADE LAND
CUT AND FILL LAND
CUT AND FILL LAND
WALLKILL
RIVER
WALLKILL
RIVER
Wallkill
S H A W A N G U N K
PLATTEKILL
Aqueduct
Catskill
Catskill Aqueduct
ORANGE COUNTY
PENN
CENTRAL
water
G.P.
C.F.
208
300
1 Mile
5 000 Feet
Scale 1:15 840
0
1000
2000
3000
4000
5000
1/4
1/2
3/4


(Joins sheet 129)
(Joins sheet 135)
(Joins sheet 137)
(Joins inset, sheet 139)
N
1 Mile
5 000 Feet
Scale 1:15 840
P L A T T E K I L L
Plattekill
ORANGE COUNTY
ORANGE COUNTY
NEW YORK STATE THRUWAY
CONRAIL
water
MADE LAND


137
(Joins sheet 130)
(Joins sheet 136)
(Joins sheet 138)
(Joins sheet 140)
580 000 FEET
590 000 FEET
585 000 FEET
595 000 FEET
MARLBOROUGH
PLATTEKILL
MARLBORO MOUNTAIN
Gidneytown Creek
water
N
1 Mile
5 000 Feet
Scale 1:15 840


138
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 131)
(Joins sheet 137)
(Joins inset)
MARLBOROUGH
Marlboro
HUDSON RIVER
CONRAIL
GRAVEL PIT
CUT AND FILL LAND
QUARRY
615 000 FEET
590 000 FEET
585 000 FEET
600 000 FEET
(Joins lower left)
(Joins sheet 140)
603 000 FEET
580 000 FEET
578 000 FEET
598 000 FEET
ORANGE COUNTY
2000 AND 3000-FOOT GRID TICKS


139
N
(Joins sheet 135)
(Joins inset, sh 133)
540 000 FEET
580 000 FEET
555 000 FEET
570 000 FEET
SHAWANGUNK
WALLKILL RIVER
ORANGE COUNTY
St Elmo
Catskill Aqueduct
CONRAIL
water
(Joins sheet 136)
(Joins sheet 140)
573 000 FEET
575 000 FEET
PLATTEKILL
2000 AND 5000-FOOT GRID TICKS
1 Mile
5 000 Feet
Scale 1:15 840


140
N
(Joins sheet 137)
(Joins inset, sheet 139)
(Joins inset, sheet 138)
M A R L B O R O U G H
P L A T T E K I L L
ORANGE COUNTY
Gidneytown
MADE LAND
water
595 000 FEET
580 000 FEET
570 000 FEET
580 000 FEET
Scale 1:15 840
1 Mile
5 000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1